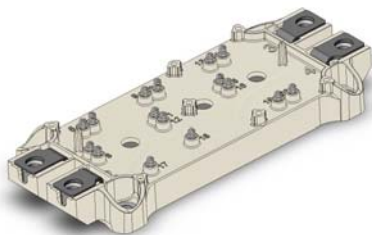


# SEMiX553GAL128Ds



SEMiX<sup>®</sup> 3s

## SPT IGBT Modules

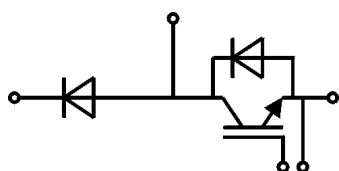
### SEMiX553GAL128Ds

#### Features

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

#### Typical Applications\*

- AC inverter drives
- UPS
- Electronic welders up to 20 kHz

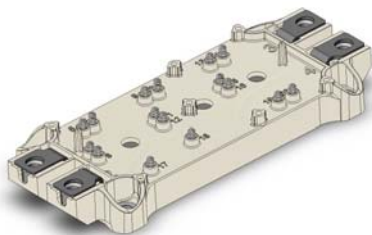


GAL

Absolute Maximum Ratings					
Symbol	Conditions		Values	Unit	
<b>IGBT</b>					
$V_{CES}$			1200	V	
$I_C$	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	533	A	
		$T_c = 80\text{ °C}$	379	A	
$I_{Cnom}$			300	A	
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$		600	A	
$V_{GES}$			-20 ... 20	V	
$t_{psc}$	$V_{CC} = 600\text{ V}$ $V_{GE} \leq 20\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 125\text{ °C}$	10		$\mu\text{s}$
$T_j$			-40 ... 150	$^{\circ}\text{C}$	
<b>Inverse diode</b>					
$I_F$	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	421	A	
		$T_c = 80\text{ °C}$	289	A	
$I_{Fnom}$			300	A	
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$		600	A	
$I_{FSM}$	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25\text{ °C}$		2300	A	
$T_j$			-40 ... 150	$^{\circ}\text{C}$	
<b>Freewheeling diode</b>					
$I_F$	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	521	A	
		$T_c = 80\text{ °C}$	347	A	
$I_{Fnom}$			300	A	
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$		600	A	
$I_{FSM}$	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25\text{ °C}$		2300	A	
$T_j$			-40 ... 150	$^{\circ}\text{C}$	
<b>Module</b>					
$I_{t(RMS)}$			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
<b>IGBT</b>						
$V_{CE(sat)}$	$I_C = 300\text{ A}$ $V_{GE} = 15\text{ V}$ chipllevel	$T_j = 25\text{ °C}$	1.9	2.35		V
		$T_j = 125\text{ °C}$	2.1	2.55		V
$V_{CE0}$		$T_j = 25\text{ °C}$	1	1.15		V
		$T_j = 125\text{ °C}$	0.9	1.05		V
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ °C}$	3.0	4.0		$\text{m}\Omega$
		$T_j = 125\text{ °C}$	4.0	5.0		$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 12\text{ mA}$		4.5	5	6.5	V
$I_{CES}$	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25\text{ °C}$	0.1	0.3		$\text{mA}$
		$T_j = 125\text{ °C}$				$\text{mA}$
$C_{ies}$	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	28.3			nF
$C_{oes}$		$f = 1\text{ MHz}$	1.86			nF
$C_{res}$		$f = 1\text{ MHz}$	1.17			nF
$Q_G$	$V_{GE} = -8\text{ V...} + 15\text{ V}$		2880			nC
$R_{Gint}$	$T_j = 25\text{ °C}$		1.33			$\Omega$

# SEMiX553GAL128Ds



SEMiX® 3s

## SPT IGBT Modules

### SEMiX553GAL128Ds

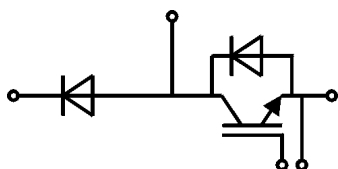
#### Features

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

#### Typical Applications\*

- AC inverter drives
- UPS
- Electronic welders up to 20 kHz

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$		185		ns
$t_r$	$I_C = 300\text{ A}$	$T_j = 125\text{ °C}$		65		ns
$E_{on}$	$R_{G\ on} = 3\ \Omega$	$T_j = 125\text{ °C}$		27		mJ
$t_{d(off)}$	$R_{G\ off} = 3\ \Omega$	$T_j = 125\text{ °C}$		635		ns
$t_f$		$T_j = 125\text{ °C}$		80		ns
$E_{off}$		$T_j = 125\text{ °C}$		33		mJ
$R_{th(j-c)}$	per IGBT				0.061	K/W
Inverse diode						
$V_F = V_{EC}$	$I_F = 300\text{ A}$	$T_j = 25\text{ °C}$		2.0	2.50	V
	$V_{GE} = 0\text{ V}$ chip	$T_j = 125\text{ °C}$		1.8	2.3	V
$V_{F0}$		$T_j = 25\text{ °C}$	0.75	1.1	1.45	V
		$T_j = 125\text{ °C}$	0.5	0.85	1.2	V
$r_F$		$T_j = 25\text{ °C}$	2.5	3.0	3.5	m $\Omega$
		$T_j = 125\text{ °C}$	2.7	3.2	3.7	m $\Omega$
$I_{RRM}$	$I_F = 300\text{ A}$	$T_j = 125\text{ °C}$		325		A
$Q_{rr}$	$di/dt_{off} = 5400\text{ A}/\mu\text{s}$	$T_j = 125\text{ °C}$		46		$\mu\text{C}$
$E_{rr}$	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$		17		mJ
$R_{th(j-c)}$	per diode				0.11	K/W
Freewheeling diode						
$V_F = V_{EC}$	$I_F = 300\text{ A}$	$T_j = 25\text{ °C}$		2.0	2.5	V
	$V_{GE} = 0\text{ V}$ chip	$T_j = 125\text{ °C}$		1.8	2.3	V
$V_{F0}$		$T_j = 25\text{ °C}$	0.75	1.1	1.45	V
		$T_j = 125\text{ °C}$	0.5	0.85	1.2	V
$r_F$		$T_j = 25\text{ °C}$	2.5	3.0	3.5	m $\Omega$
		$T_j = 125\text{ °C}$	2.7	3.2	3.7	m $\Omega$
$I_{RRM}$	$I_F = 300\text{ A}$	$T_j = 125\text{ °C}$		325		A
$Q_{rr}$	$di/dt_{off} = 5400\text{ A}/\mu\text{s}$	$T_j = 125\text{ °C}$		46		$\mu\text{C}$
$E_{rr}$	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$		17		mJ
$R_{th(j-c)}$	per diode				0.11	K/W
Module						
$L_{CE}$				20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_C = 25\text{ °C}$		0.7		m $\Omega$
		$T_C = 125\text{ °C}$		1		m $\Omega$
$R_{th(c-s)}$	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						
$R_{100}$	$T_C = 100\text{ °C}$ ( $R_{25} = 5\text{ k}\Omega$ )			$493 \pm 5\%$		$\Omega$
$B_{100/125}$	$R_{(T)} = R_{100} \exp[B_{100/125}(1/T - 1/T_{100})]$ ; $T[\text{K}]$ ;			$3550$ $\pm 2\%$		K



GAL

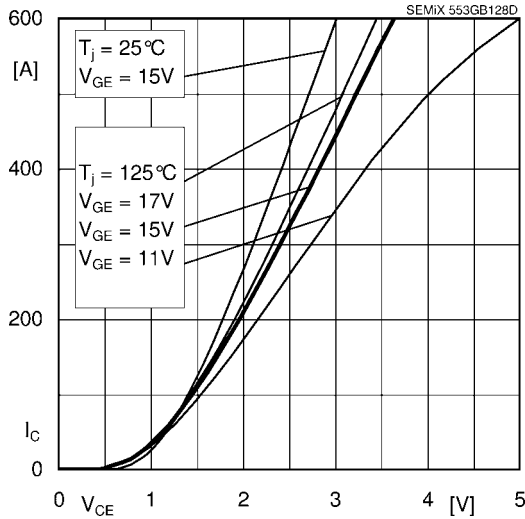


Fig. 1: Typ. output characteristic, inclusive  $R_{CC'+EE}$

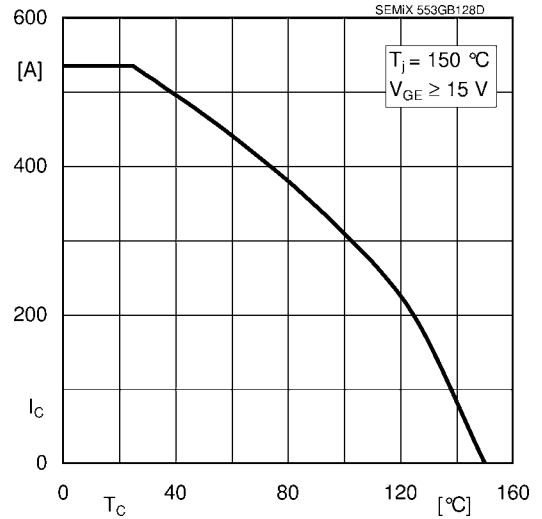


Fig. 2: Rated current vs. temperature  $I_C = f(T_C)$

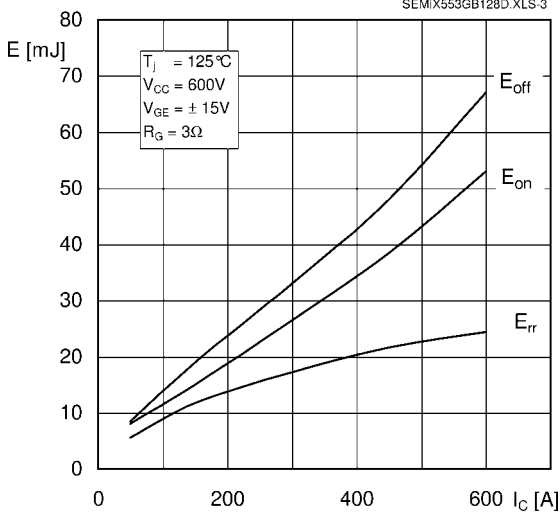


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

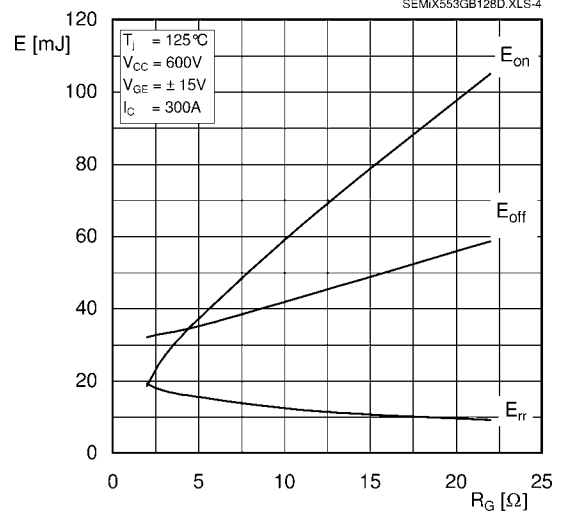


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

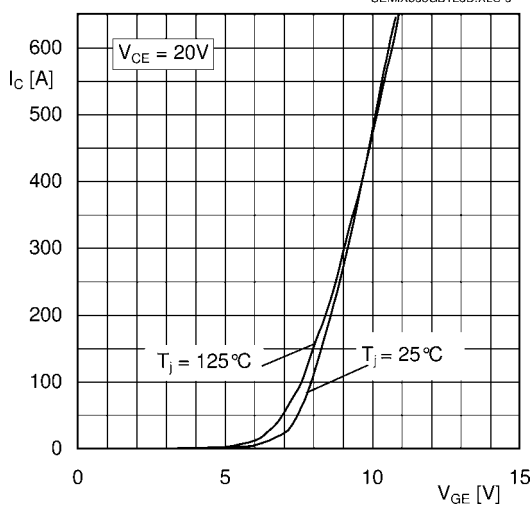


Fig. 5: Typ. transfer characteristic

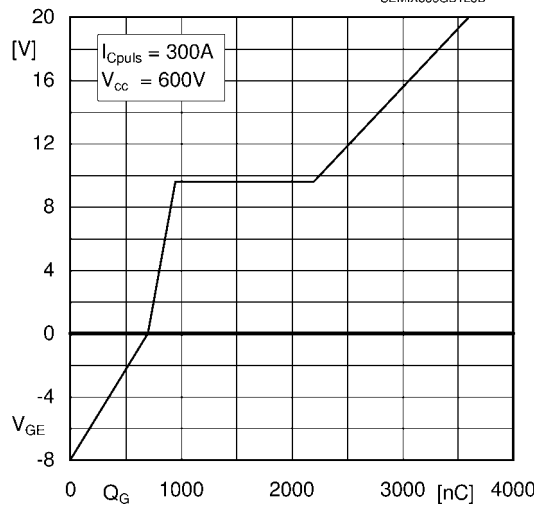


Fig. 6: Typ. gate charge characteristic

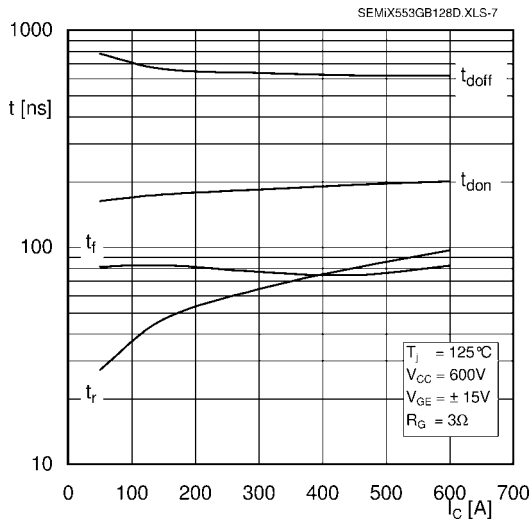


Fig. 7: Typ. switching times vs.  $I_C$

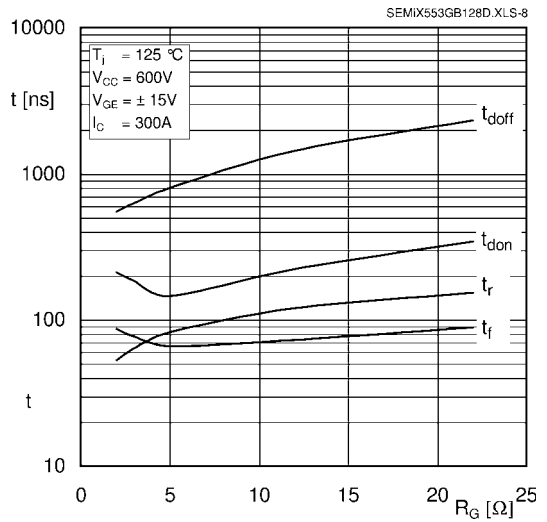


Fig. 8: Typ. switching times vs. gate resistor  $R_G$

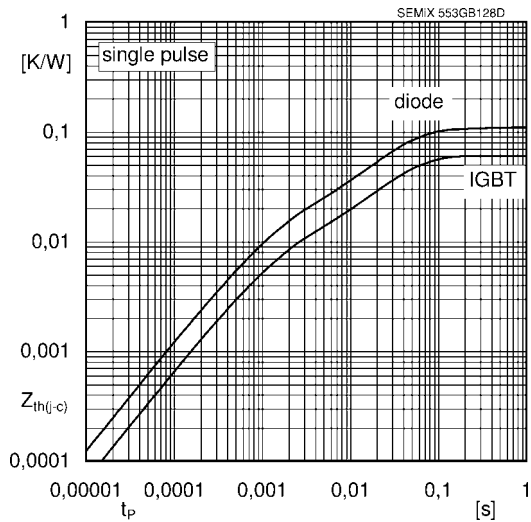


Fig. 9: Typ. transient thermal impedance

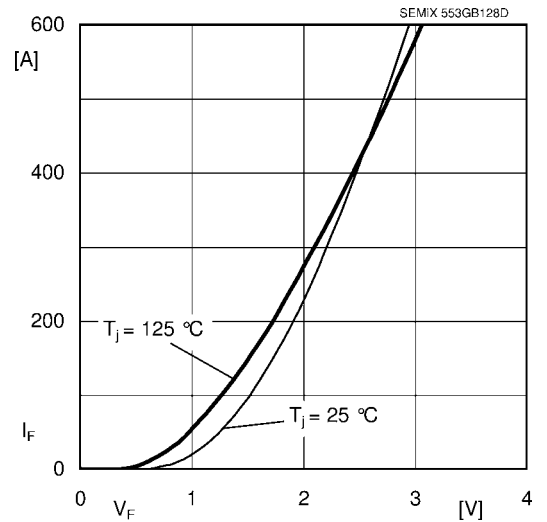


Fig. 10: Typ. CAL diode forward charact., incl.  $R_{CC+EE'}$

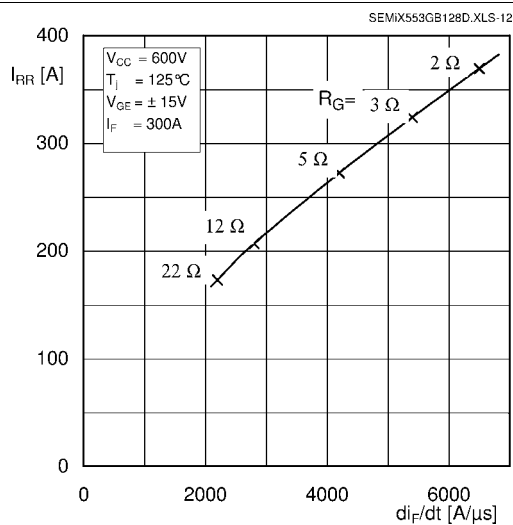


Fig. 11: Typ. CAL diode peak reverse recovery current

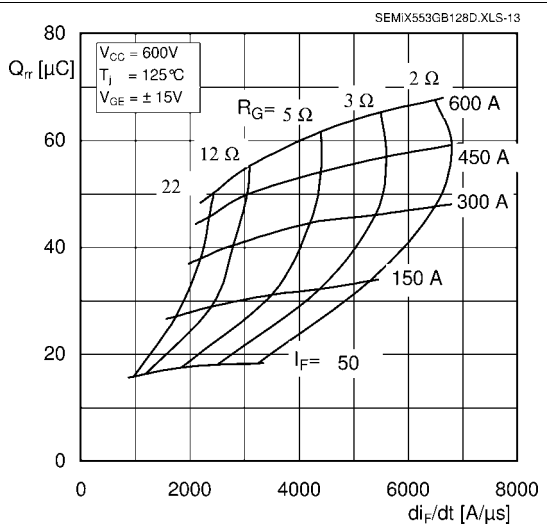


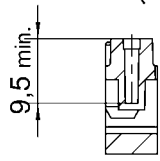
Fig. 12: Typ. CAL diode recovery charge

# SEMiX553GAL128Ds

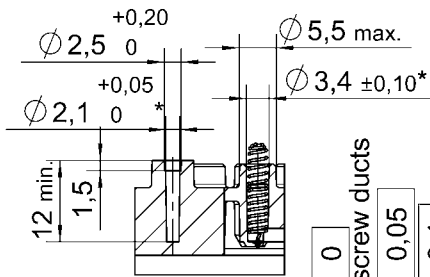
Case: SEMiX 3s

general tolerance ISO 2768-mK

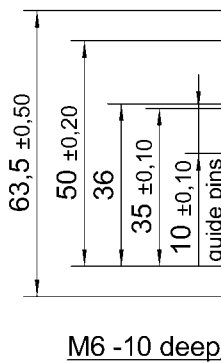
screw duct  
(1x centre) :  
H-H (1:1)



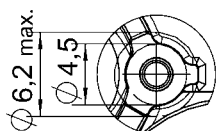
screw duct (6x)  
spring duct (16x) :  
A-A (1:1)



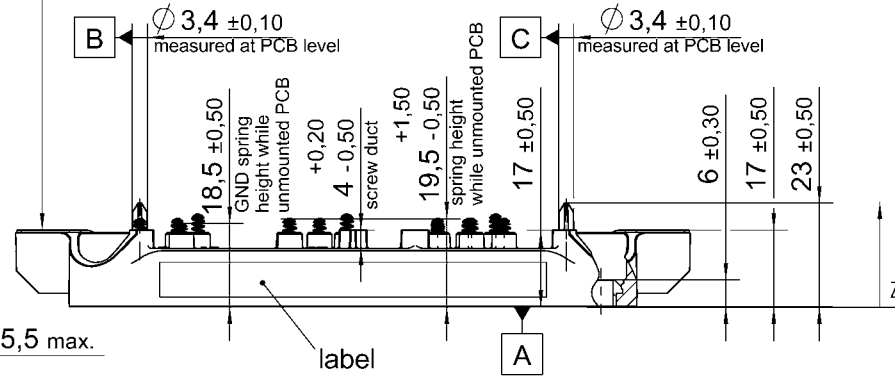
marking of terminals



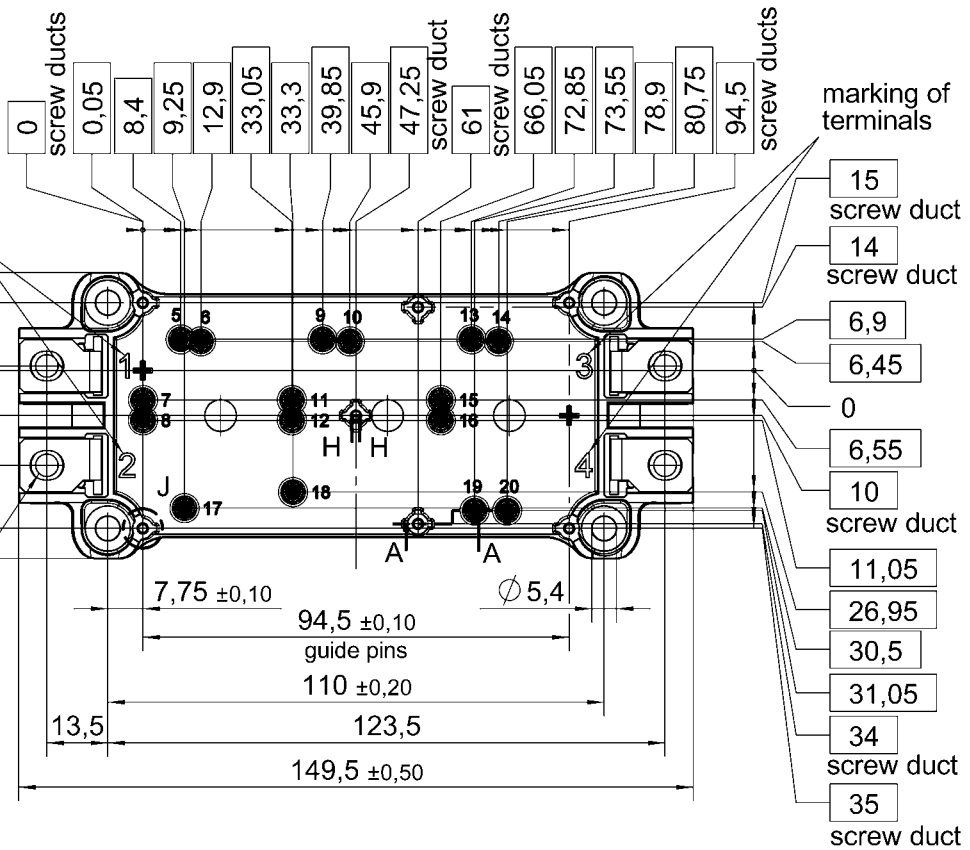
screw duct  
top view (7x) :  
J (2:1)



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



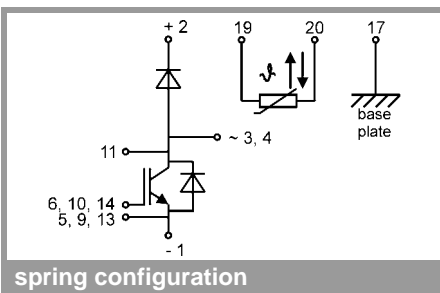
All measures in Z-direction  
valid as mounted to heat sink



\*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

# SEMiX553GAL128Ds

\* 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.