



**SEMiX® 5**

## Bridge Rectifier Module (halfcontrolled)

### SEMiX365DH16

#### Features

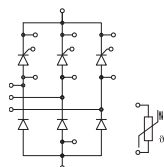
- Terminal height 17 mm
- Solderless assembling solution with PressFIT signal pins and screw power terminals
- NTC temperature sensor inside

#### Typical Applications\*

- Input Bridge Rectifier for AC/DC motor control
- Power supply

#### Remarks

Reliability tests performed at  $T_j = 130^\circ\text{C}$   
For storage and case temperature with TIM see document "TP(HALA P8) SEMiX 5p"



DH

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
<b>Module</b>				
$I_D$	$T_j = 130^\circ\text{C}$ rec. $120^\circ$	$T_c = 96^\circ\text{C}$	484	A
		$T_c = 80^\circ\text{C}$	629	A
$T_{stg}$	module without TIM		-40 ... 125	$^\circ\text{C}$
$V_{isol}$	AC sinus 50Hz, $t = 1$ min		4000	V

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
<b>Thyristor</b>				
$I_{T(AV)}$	$T_j = 130^\circ\text{C}$ sinus $180^\circ$	$T_c = 80^\circ\text{C}$	221	A
		$T_c = 100^\circ\text{C}$	155	A
$I_{TSM}$	10 ms	$T_j = 25^\circ\text{C}$	3050	A
		$T_j = 130^\circ\text{C}$	2750	A
$i^2t$	10 ms	$T_j = 25^\circ\text{C}$	46513	$\text{A}^2\text{s}$
		$T_j = 130^\circ\text{C}$	37813	$\text{A}^2\text{s}$
$V_{RSM}$			1700	V
$V_{RRM}$			1600	V
$V_{DRM}$			1600	V
$(di/dt)_{cr}$	$T_j = 130^\circ\text{C}$		200	$\text{A}/\mu\text{s}$
$(dv/dt)_{cr}$	$T_j = 130^\circ\text{C}$		1000	$\text{V}/\mu\text{s}$
$T_j$			-40 ... 130	$^\circ\text{C}$

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
<b>Diode</b>				
$I_{FAV}$	$T_j = 150^\circ\text{C}$ sin. $180^\circ$	$T_c = 80^\circ\text{C}$	249	A
		$T_c = 100^\circ\text{C}$	200	A
$I_{FSM}$	10 ms	$T_j = 25^\circ\text{C}$	3300	A
		$T_j = 130^\circ\text{C}$	2500	A
$i^2t$	10 ms	$T_j = 25^\circ\text{C}$	54450	$\text{A}^2\text{s}$
		$T_j = 130^\circ\text{C}$	31250	$\text{A}^2\text{s}$
$V_{RSM}$			1700	V
$V_{RRM}$			1600	V
$T_j$			-40 ... 150	$^\circ\text{C}$

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Temperature Sensor</b>					
$R_{100}$	$T_c = 100^\circ\text{C}$ ( $R_{25} = 5 \text{ k}\Omega$ )		$493 \pm 5\%$		$\Omega$
$B_{100/125}$	$R(T) = R_{100} \exp[B_{100/125}(1/T - 1/T_{100})]$ ; $T[\text{K}]$ ;		$3550 \pm 2\%$		K



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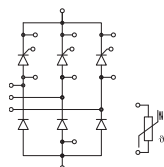
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Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Thyristor</b>					
$V_T$	$T_j = 130^\circ\text{C}$ , $I_T = 210\text{ A}$ , chiplevel		1.05	1.14	V
$V_{T(TO)}$	$T_j = 130^\circ\text{C}$ , chiplevel		0.80	0.85	V
$r_T$	$T_j = 130^\circ\text{C}$ , chiplevel		1.32	1.4	m $\Omega$
$I_{DD}; I_{RD}$	$T_j = 130^\circ\text{C}$ , $V_{DD} = V_{DRM}$ ; $V_{RD} = V_{RRM}$			54	mA
$t_{gd}$	$T_j = 25^\circ\text{C}$ , $I_G = 1\text{ A}$ , $di_G/dt = 1\text{ A}/\mu\text{s}$		1		$\mu\text{s}$
$t_{gr}$	$V_D = 0.67 * V_{DRM}$		2		$\mu\text{s}$
$t_q$	$T_j = 130^\circ\text{C}$		150		$\mu\text{s}$
$I_H$	$T_j = 25^\circ\text{C}$		150	220	mA
$I_L$	$T_j = 25^\circ\text{C}$ , $R_G = 33\ \Omega$		300	550	mA
$V_{GT}$	$T_j = 25^\circ\text{C}$ , d.c.	1.65			V
$I_{GT}$	$T_j = 25^\circ\text{C}$ , d.c.	100			mA
$V_{GD}$	$T_j = 130^\circ\text{C}$ , d.c.			0.25	V
$I_{GD}$	$T_j = 130^\circ\text{C}$ , d.c.			10	mA
$R_{th(j-c)}$	per thyristor, sin. $180^\circ$			0.14	K/W
$R_{th(c-s)}$	per thyristor ( $\lambda_{grease}=0.81\text{ W}/(\text{m}^*\text{K})$ )		0.054		K/W
$R_{th(c-s)}$	per thyristor, pre-applied phase change material		0.023		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Diode</b>					
$V_F$	$I_F = 210\text{ A}$ chiplevel	$T_j = 25^\circ\text{C}$	1.04	1.28	V
		$T_j = 150^\circ\text{C}$	0.95	1.18	V
$V_{(TO)}$	chiplevel	$T_j = 25^\circ\text{C}$	0.88	0.98	V
		$T_j = 125^\circ\text{C}$	0.73	0.83	V
$r_T$	chiplevel	$T_j = 25^\circ\text{C}$	0.75	1.44	m $\Omega$
		$T_j = 125^\circ\text{C}$	1.06	1.69	m $\Omega$
$I_{RD}$	$T_j = 130^\circ\text{C}$ , $V_{RD} = V_{RRM}$			2	mA
$R_{th(j-c)}$	per diode, sin. $180^\circ$			0.15	K/W
$R_{th(c-s)}$	per Diode ( $\lambda_{grease}=0.81\text{ W}/(\text{m}^*\text{K})$ )		0.059		K/W
$R_{th(c-s)}$	per Diode, pre-applied phase change material		0.033		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Module</b>					
$L_{CE}$			20		nH
$R_{CC+EE}$	measured per switch	$T_C = 25^\circ\text{C}$	0.8		m $\Omega$
		$T_C = 125^\circ\text{C}$	1.1		m $\Omega$
$R_{th(c-s)1}$	calculated without thermal coupling		0.009		K/W
$R_{th(c-s)2}$	including thermal coupling, Ts underneath module ( $\lambda_{grease}=0.81\text{ W}/(\text{m}^*\text{K})$ )		0.015		K/W
$R_{th(c-s)1}$	calculated without thermal coupling; pre-applied phase change material		0.005		K/W
$R_{th(c-s)2}$	including thermal coupling, Ts underneath module, pre-applied phase change material		0.007		K/W
$M_s$	to heat sink (M5)	3		6	Nm
$M_t$	to terminals (M6)	3		6	Nm
$w$			398		g

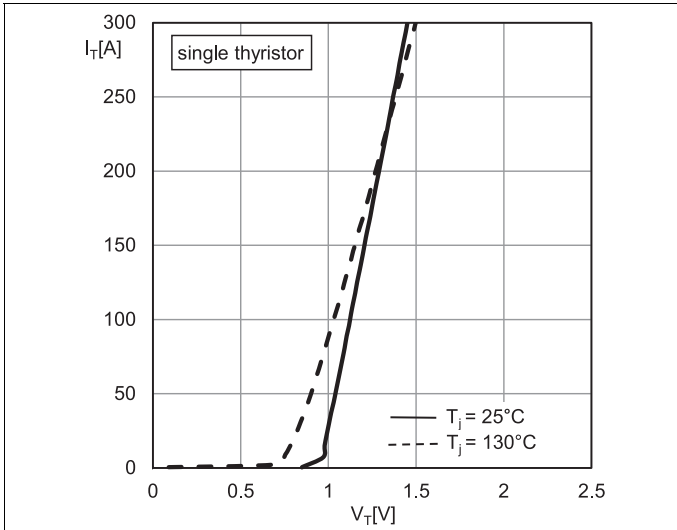


Fig. 1: Thyristor typ. on-state characteristic, incl.  $R_{CC'+EE'}$

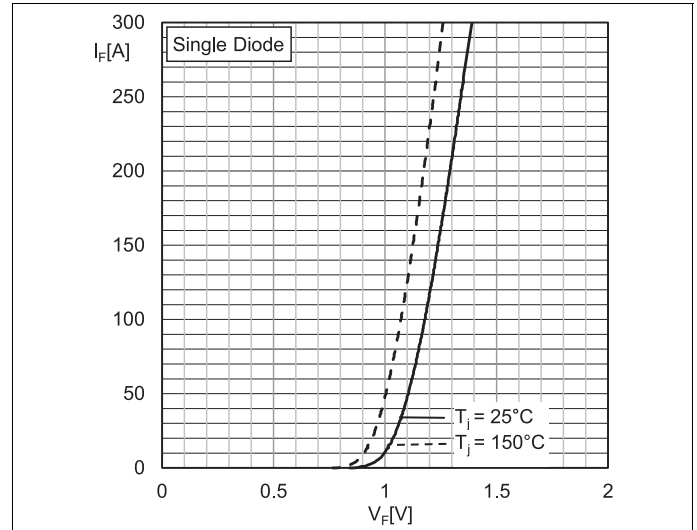


Fig. 2: Diode typ. on-state characteristic, incl.  $R_{CC'+EE'}$

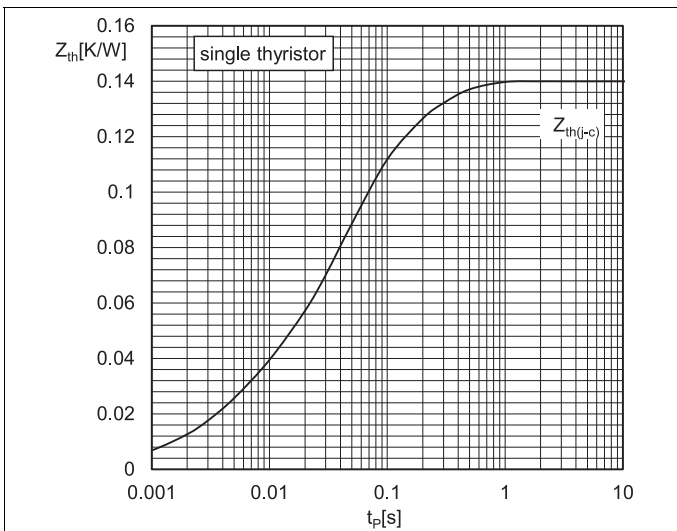


Fig. 3: Thyristor transient thermal impedance vs. time

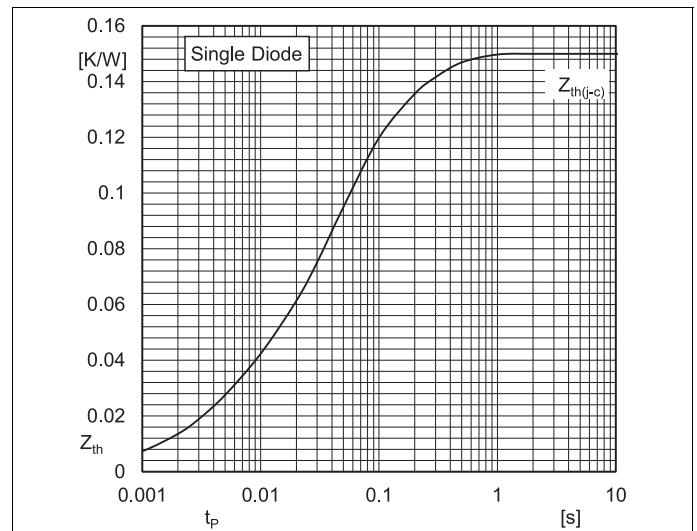


Fig. 4: Diode transient thermal impedance vs. time

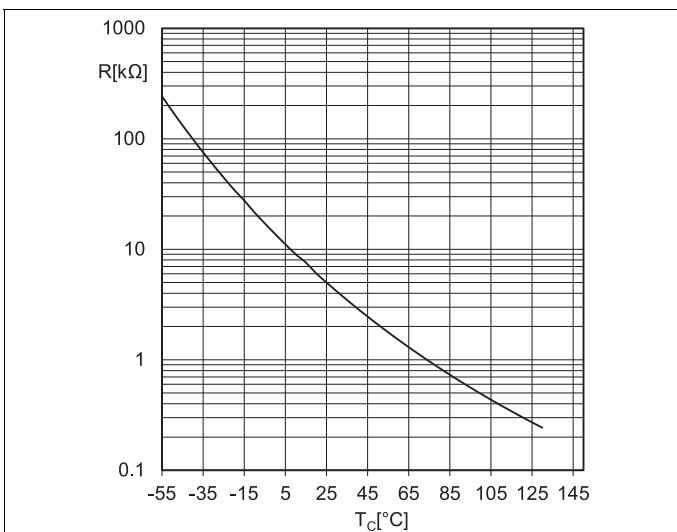
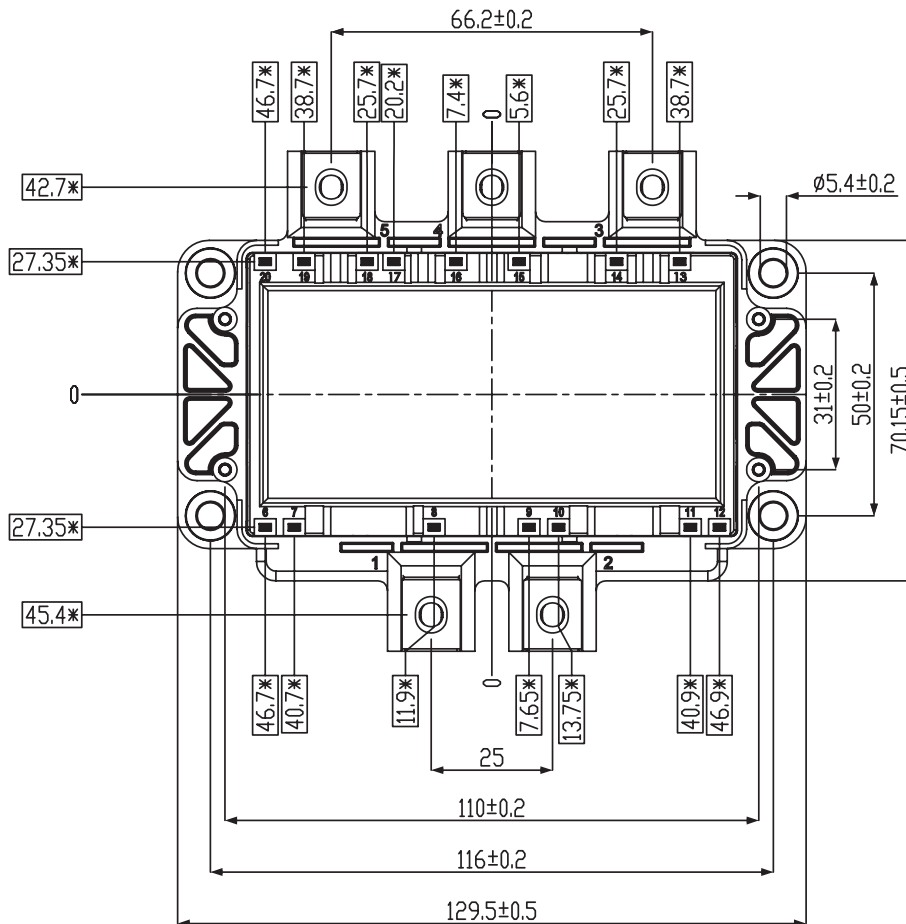
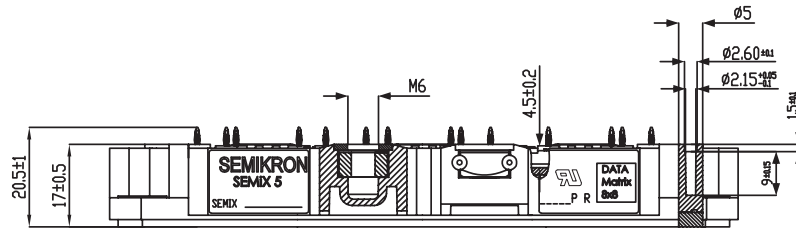


Fig. 5: Typ. NTC-temperature characteristics

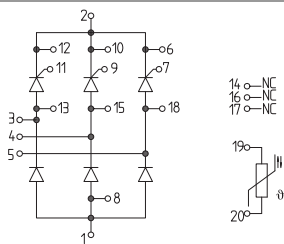
# SEMiX365DH16



\* = All dimensions with tolerance of  $\pm 0.4$

For technical details please refer  
to SEMiX(R)5 Mounting Instruction

SEMiX5p



DH

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

## **\*IMPORTANT INFORMATION AND WARNINGS**

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