

SEMiX241DH16s



SEMiX® 13

Bridge Rectifier Module (halfcontrolled)

SEMiX241DH16s

Features

- Terminal height 17 mm
- Chips soldered directly to isolated substrate
- UL recognised file no. E63532

Typical Applications*

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

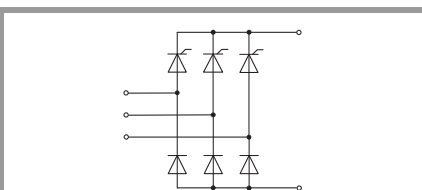
Remarks

- For storage and case temperature with TIM see document "TP(*) SEMiX 13"

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Module				
I_D	$T_j = 130\text{ °C}$ rec. 120 °C	$T_c = 85\text{ °C}$	392	A
		$T_c = 100\text{ °C}$	298	A
T_{stg}	module without TIM		-40 ... 125	°C
V_{isol}	AC sinus 50Hz, $t = 1\text{ min}$		4000	V

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Thyristor				
$I_{T(AV)}$	$T_j = 130\text{ °C}$ sinus 180 °	$T_c = 85\text{ °C}$	138	A
		$T_c = 100\text{ °C}$	104	A
I_{TSM}	10 ms	$T_j = 25\text{ °C}$	2000	A
		$T_j = 130\text{ °C}$	1800	A
i^2t	10 ms	$T_j = 25\text{ °C}$	20000	A ² s
		$T_j = 130\text{ °C}$	16200	A ² s
V_{RSM}			1700	V
V_{RRM}			1600	V
V_{DRM}			1600	V
$(di/dt)_{cr}$	$T_j = 130\text{ °C}$		100	A/μs
$(dv/dt)_{cr}$	$T_j = 130\text{ °C}$		1000	V/μs
T_j			-40 ... 130	°C

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode				
I_{FAV}	$T_j = 150\text{ °C}$ sin. 180 °	$T_c = 85\text{ °C}$	160	A
		$T_c = 100\text{ °C}$	135	A
I_{FSM}	10 ms	$T_j = 25\text{ °C}$	2000	A
		$T_j = 150\text{ °C}$	1650	A
i^2t	10 ms	$T_j = 25\text{ °C}$	20000	A ² s
		$T_j = 150\text{ °C}$	13612	A ² s
V_{RSM}			1700	V
V_{RRM}			1600	V
T_j			-40 ... 150	°C



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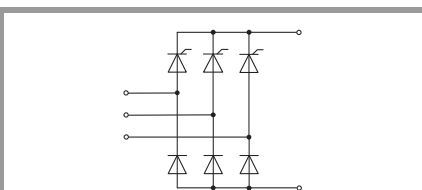
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Typical Applications*

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Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Thyristor					
V_T	$T_j = 130\text{ °C}$, $I_T = 300\text{ A}$, chiplevel		1.40	1.53	V
$V_{T(TO)}$	$T_j = 130\text{ °C}$, chiplevel		0.84	0.85	V
r_T	$T_j = 130\text{ °C}$, chiplevel		1.85	2.3	mΩ
$I_{DD}; I_{RD}$	$T_j = 130\text{ °C}$, $V_{DD} = V_{DRM}$; $V_{RD} = V_{RRM}$			21	mA
t_{gd}	$T_j = 25\text{ °C}$, $I_G = 1\text{ A}$, $di_G/dt = 1\text{ A}/\mu\text{s}$		1		μs
t_{gr}	$V_D = 0.67 \cdot V_{DRM}$		2		μs
t_q	$T_j = 130\text{ °C}$		150		μs
I_H	$T_j = 25\text{ °C}$			220	mA
I_L	$T_j = 25\text{ °C}$, $R_G = 33\text{ Ω}$			550	mA
V_{GT}	$T_j = 25\text{ °C}$, d.c.	2			V
I_{GT}	$T_j = 25\text{ °C}$, d.c.	100			mA
V_{GD}	$T_j = 130\text{ °C}$, d.c.			0.25	V
I_{GD}	$T_j = 130\text{ °C}$, d.c.			3.8	mA
$R_{th(j-c)}$	per thyristor, sin. 180°			0.2	K/W
$R_{th(c-s)}$	per thyristor ($\lambda_{grease}=0.81\text{ W}/(\text{m}^2\text{K})$)		0.072		K/W
$R_{th(c-s)}$	per thyristor, pre-applied phase change material		0.05		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Diode					
V_F	$I_F = 300\text{ A}$ chiplevel	$T_j = 25\text{ °C}$	1.22	1.63	V
		$T_j = 125\text{ °C}$	1.21	1.59	V
$V_{(TO)}$	chiplevel	$T_j = 25\text{ °C}$	0.88	0.98	V
		$T_j = 125\text{ °C}$	0.73	0.83	V
r_T	chiplevel	$T_j = 25\text{ °C}$	1.13	2.2	mΩ
		$T_j = 125\text{ °C}$	1.60	2.5	mΩ
I_{RD}	$T_j = 145\text{ °C}$, $V_{RD} = V_{RRM}$			1.1	mA
$R_{th(j-c)}$	per diode, sin. 180°			0.22	K/W
$R_{th(c-s)}$	per Diode ($\lambda_{grease}=0.81\text{ W}/(\text{m}^2\text{K})$)		0.075		K/W
$R_{th(c-s)}$	per Diode, pre-applied phase change material		0.063		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Module					
L_{CE}			20		nH
$R_{CC'+EE'}$	measured per switch	$T_C = 25\text{ °C}$	0.7		mΩ
		$T_C = 125\text{ °C}$	1		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling		0.012		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module ($\lambda_{grease}=0.81\text{ W}/(\text{m}^2\text{K})$)		0.018		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, pre-applied phase change material		0.014		K/W
M_s	to heat sink (M5)	3		5	Nm
M_t	to terminals (M6)	2.5		5	Nm
w				350	g

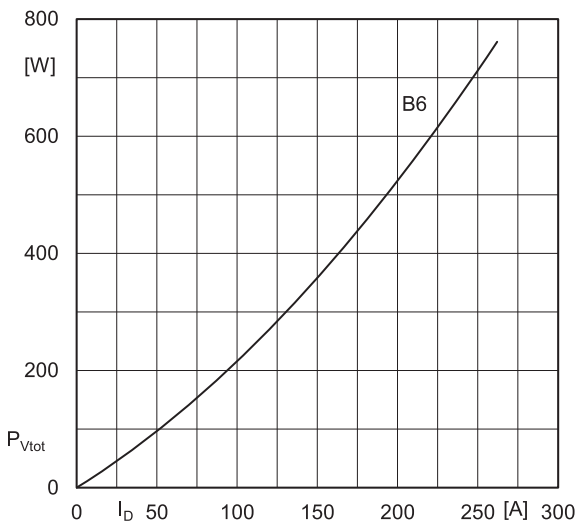


Fig. 4L: Power dissipation per module vs. direct current

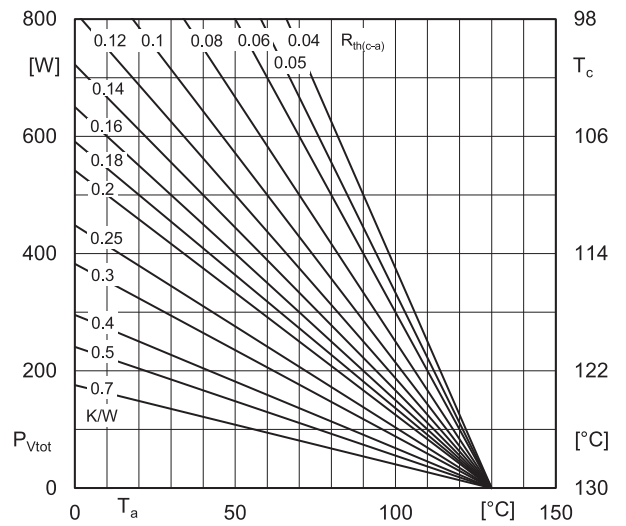


Fig. 4R: Power dissipation per module vs. ambient temperature

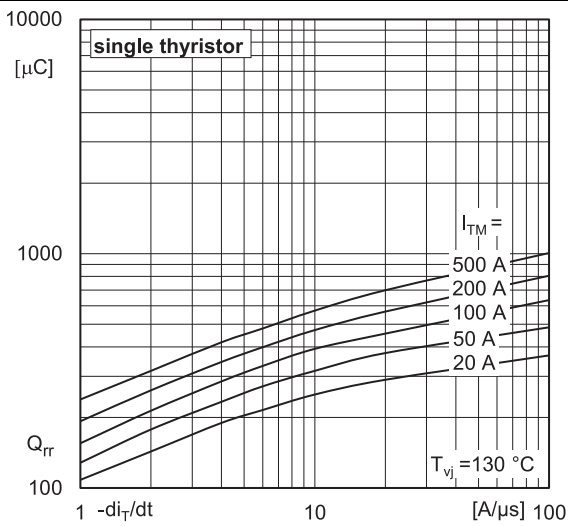


Fig. 5: Recovered charge vs. current decrease

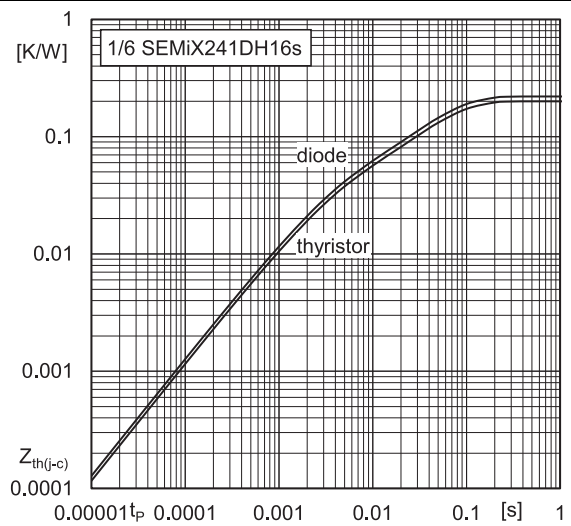


Fig. 6: Transient thermal impedance vs. time

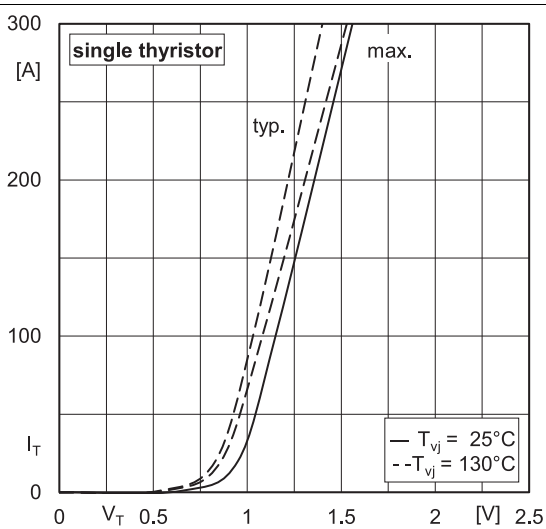


Fig. 7: On-state characteristics

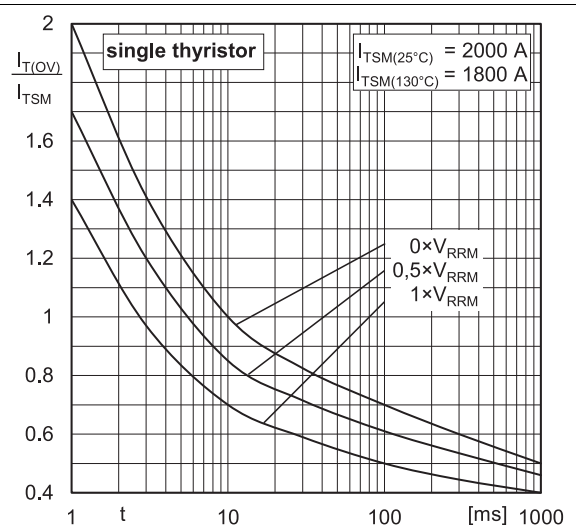


Fig. 8: Surge overload current vs. time

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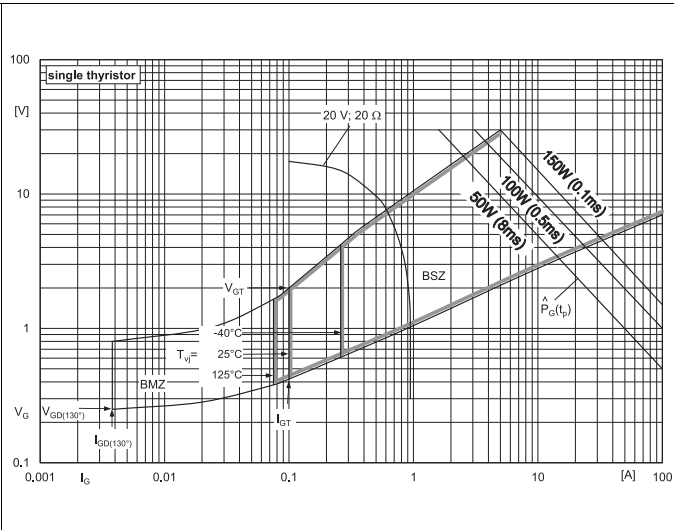
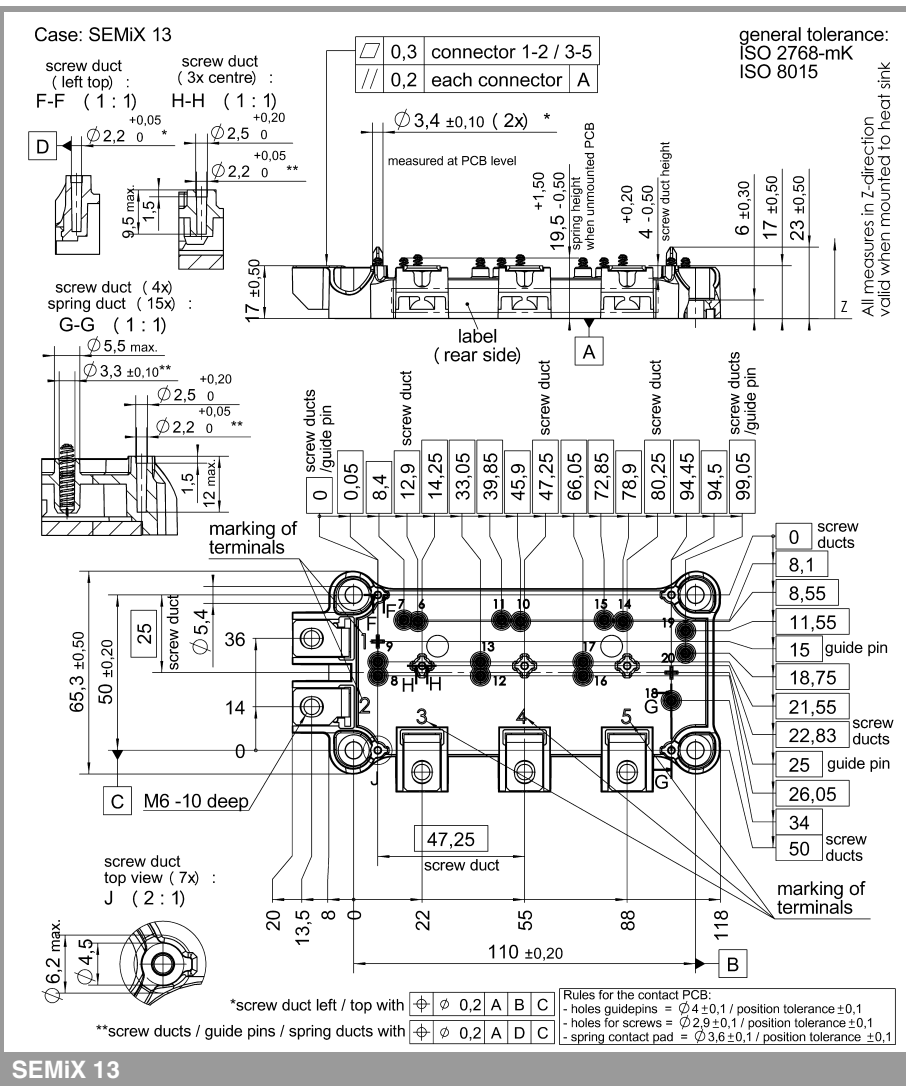


Fig. 9: Gate trigger characteristics



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