

# STTH20003TV

## Ultrafast high voltage rectifier

#### Mian product characteristics

I <sub>F(AV)</sub>	up to 2 x 100 A
V <sub>RRM</sub>	300 V
T <sub>j</sub> (max)	150° C
V <sub>F</sub> (typ)	0.95 V
t <sub>rr</sub> (max)	90 ns

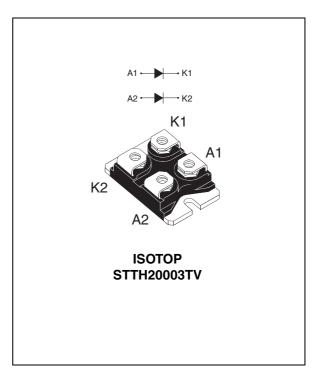
#### Features and benefits

- Combines highest recovery and reverse voltage performance
- Ultrafast, soft and noise-free recovery
- Package insulation voltage 2500 V<sub>rms</sub>
- low inductance and low capacitance allow simpler layout

#### Description

Dual rectifiers suited for Switch Mode Power Supply and high frequency DC to DC converters.

Packaged in ISOTOP<sup>™</sup>, this device is intended for use in low voltage, high frequency inverters, free wheeling operation, welding equipment and telecom power supplies.



#### Order codes

Part number	Marking
STTH20003TV	STTH20003TV

#### Table 1.Absolute ratings (limiting values, per diode, T<sub>c</sub> = 25° C unless otherwise stated)

Symbol	Parar	Value	Unit		
V <sub>RRM</sub>	Repetitive peak reverse voltage			300	V
I <sub>F(RMS)</sub>	RMS forward current			180	А
	I <sub>F(AV)</sub> Average forward current	$T_{c} = 85^{\circ} C \delta = 0.5$	Per diode	100	А
'F(AV)			Per device	200	~
I <sub>FSM</sub>	Surge non repetitive forward current $t_p = 10 \text{ ms sinusoidal}$			100	А
T <sub>stg</sub>	Storage temperature range	-55 to + 150	°C		
Тj	Maximum operating junction temperature			150	°C

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## 1 Characteristics

Symbol	Symbol Parameter		Value (max).	Unit
Р	lunction to copp	Per diode	0.55	
Пth(j-c)	R <sub>th(j-c)</sub> Junction to case		0.35	°C/W
R <sub>th(c)</sub>	Coupling		0.1	

When diodes 1 and 2 are used simultaneously:

 $\Delta$  Tj(diode 1) = P(diode 1) x R<sub>th(j-c)</sub>(Per diode) + P(diode 2) x R<sub>th(c)</sub>

 Table 3.
 Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Тур	Max.	Unit
I <sub>B</sub> <sup>(1)</sup>	Reverse leakage	$T_j = 25^\circ C$	V <sub>B</sub> = 300 V			200	μA
'R'	current	T <sub>j</sub> = 125° C	$T_j = 125^{\circ} C$		0.2	2	mA
V_(2)	$V_F^{(2)}$ Forward voltage drop $\frac{T_j = 25^{\circ} C}{T_j = 150^{\circ} C}$ $I_F = 10$	$I_{\rm E} = 100  {\rm A}$			1.20	V	
VF` ´				0.8	0.95	v	

1. Pulse test:  $t_p = 5 \text{ ms}, \delta < 2\%$ 

2. Pulse test:  $t_p = 380 \ \mu s, \ \delta < 2\%$ 

To evaluate the conduction losses use the following equation:

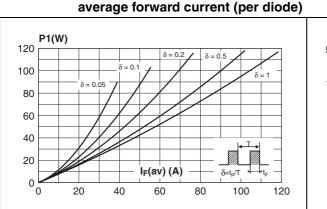
 $P = 0.75 \text{ x } I_{F(AV)} + 0.0020 I_{F^{2}(RMS)}$ 

Symbol	Parameter	Test conditions		Min	Тур	Max	Unit
			$I_{\rm F} = 0.5 \ {\rm A}  I_{\rm rr} = 0.25 \ {\rm A}  I_{\rm R} = 1 \ {\rm A}$		55		
t <sub>rr</sub>	Reverse recovery time		$I_F = 1 \text{ A} \text{ dI}_F/\text{dt} = -50 \text{ A}/\mu\text{s}$ $V_R = 30 \text{ V}$			90	ns
I <sub>RM</sub>	ourient		I <sub>F</sub> = 100 A V <sub>R</sub> = 200 V dI <sub>F</sub> /dt = -200 A/μs			18	A
S <sub>factor</sub>	Softness factor	$T_j = 125^\circ C$	I <sub>F</sub> = 100 A V <sub>R</sub> = 200 V dI <sub>F</sub> /dt = -200 A/μs		0.3		
t <sub>fr</sub>	Forward recovery time	$T_j = 25^\circ C$	$I_{F} = 100 \text{ A} \qquad dI_{F}/dt = 200 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \text{ x } V_{Fmax}$			1400	ns
V <sub>FP</sub>	Forward recovery voltage	T <sub>j</sub> = 25° C	$I_{F} = 100 \text{ A}  dI_{F}/dt = 200 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \text{ x} \text{ V}_{Fmax}$			5	V

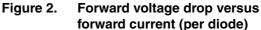
#### Table 4. Dynamic characteristics (per diode)



Figure 1.



**Conduction losses versus** 



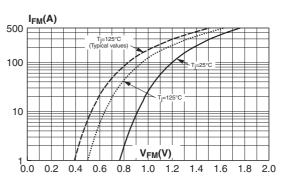


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

Peak reverse recovery current versus dl<sub>F</sub>/dt (90% confidence, per diode)

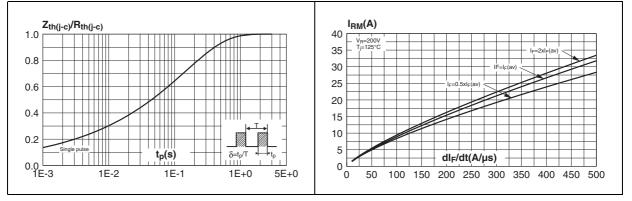
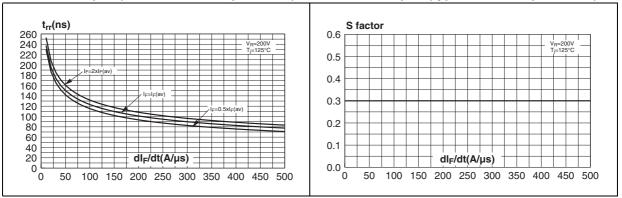


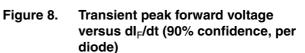
Figure 4.

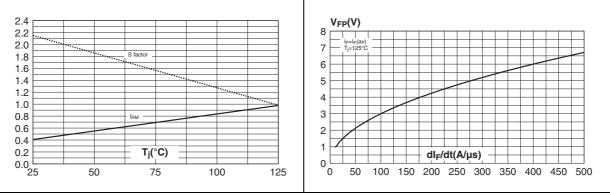
Figure 5. Reverse recovery time versus dl<sub>F</sub>/dt (90% confidence, per diode)

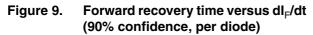
Figure 6. Softness factor  $(t_b/t_a)$  versus  $dI_F/dt$  (typical values, per diode)

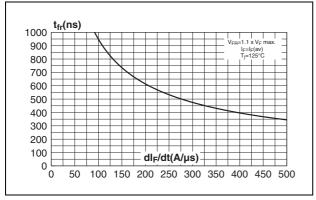


# Figure 7. Relative variations of dynamic parameters versus junction temperature (reference: $T_j = 125^{\circ} C$ )





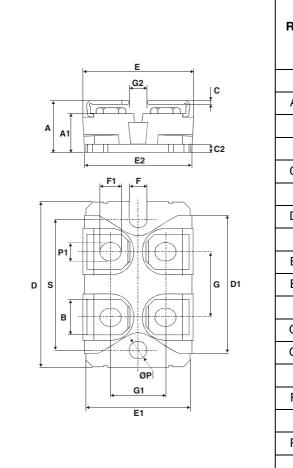




### 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.3 Nm
- Maximum torque value: 1.5 Nm

Table 5. ISOTOP Dimensions



		Dimer	nsions	
Ref.	Millin	neters	Inc	hes
	Min.	Max.	Min.	Max.
А	11.80	12.20	0.465	0.480
A1	8.90	9.10	0.350	0.358
В	7.8	8.20	0.307	0.323
С	0.75	0.85	0.030	0.033
C2	1.95	2.05	0.077	0.081
D	37.80	38.20	1.488	1.504
D1	31.50	31.70	1.240	1.248
Е	25.15	25.50	0.990	1.004
E1	23.85	24.15	0.939	0.951
E2	24.80 typ.		0.976 typ.	
G	14.90	15.10	0.587	0.594
G1	12.60	12.80	0.496	0.504
G2	3.50	4.30	0.138	0.169
F	4.10	4.30	0.161	0.169
F1	4.60	5.00	0.181	0.197
Р	4.00	4.30	0.157	0.69
P1	4.00	4.40	0.157	0.173
S	30.10	30.30	1.185	1.193

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.



## **3** Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH20003TV	STTH20003TV	ISOTOP	27 g (without screws)	10 (with screws)	Tube

## 4 Revision history

Date	Revision	Description of Changes
1999	2C	First issue
5-Sep-2006	2	Reformatted to current standards. Thermal resistance updated in Table 2.



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