

## High frequency secondary rectifier

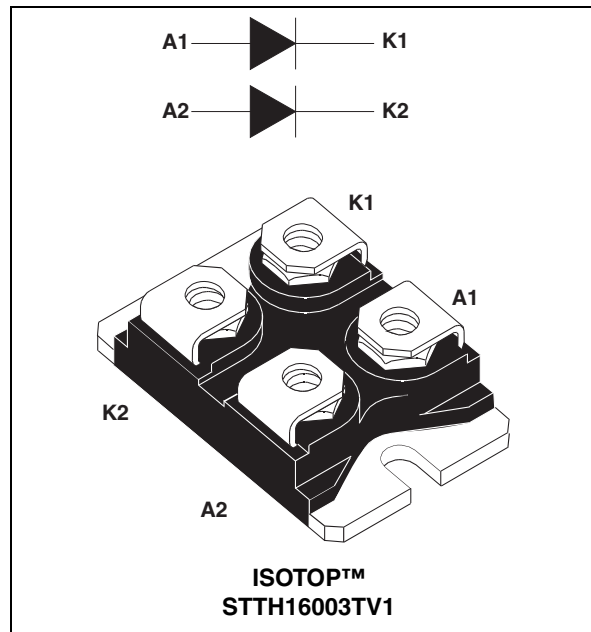
### Features

- Combines highest recovery and reverse voltage performance
- Ultra-fast, soft and noise-free recovery
- Insulated package: ISOTOP
  - insulated voltage: 2500 V rms
  - capacitance: < 45 pF
- Low inductance and low capacitance allow simplified layout

### Description

Dual rectifiers suited for switch mode power supply and high frequency DC to DC converters.

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



**Table 1. Device summary**

$I_{F(AV)}$	2 x 60 A
$V_{RRM}$	300 V
$T_j$	150 °C
$V_F$ (typ)	0.95 V
$t_{rr}$ (typ)	80 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode, T<sub>amb</sub> = 25 °C unless otherwise stated)**

Symbol	Parameter		Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage		300	V
I <sub>F(RMS)</sub>	RMS forward current		180	A
I <sub>F(AV)</sub>	Average forward current	T <sub>c</sub> = 85°C δ = 0.5 Per diode Per device	60 160	A
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms Sinusoidal	800	A
I <sub>RSM</sub>	Non repetitive peak reverse current	t <sub>p</sub> = 100 μs square	5	A
T <sub>stg</sub>	Storage temperature range		-55 to + 150	°C
T <sub>j</sub>	Maximum operating junction temperature		150	°C

**Table 3. Thermal parameters**

Symbol	Parameter		Maximum	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	0.7	°C/W
		Total	0.4	
R <sub>th(c)</sub>	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j (\text{diode1}) = P_{(\text{diode1})} \times R_{th(j-c)} (\text{per diode}) + P_{(\text{diode2})} \times R_{th(c)}$$

**Table 4. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = 300 V			200	μA
		T <sub>j</sub> = 125 °C			0.2	2	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 80 A			1.2	V
		T <sub>j</sub> = 125 °C			0.8	0.95	

1. Pulse test: t<sub>p</sub> = 5 ms, δ < 2 %
2. Pulse test: t<sub>p</sub> = 380 μs, δ < 2 %

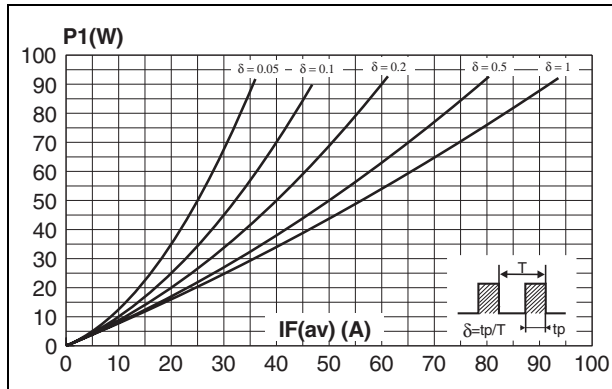
1. to evaluate the maximum conduction losses use the following equation:  

$$P = 0.75 \times I_{F(AV)} + 0.0025 I_{F(RMS)}^2$$

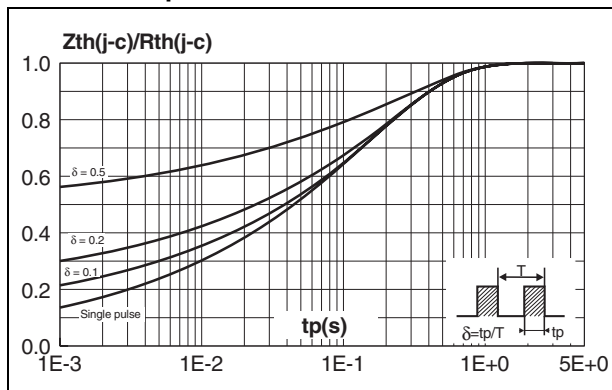
**Table 5. Recovery characteristics**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}$ $I_R = 1\text{ A}$			60	ns
			$I_F = 1\text{ A}, di_F/dt = 50\text{ A}/\mu\text{s},$ $V_R = 30\text{ V}$			80	ns
$t_{fr}$	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 80\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			1000	ns
$V_{FP}$	Forward recovery voltage					5	V
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ }^\circ\text{C}$	$I_F = 60\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s},$ $V_{cc} = 200\text{ V}$			16	A
$S_{factor}$						0.3	-

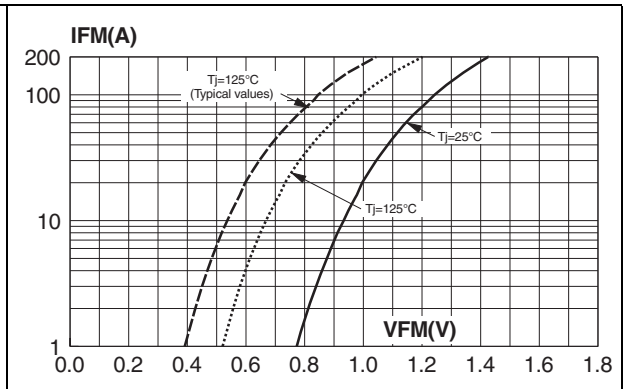
**Figure 1. Conduction losses versus average current (per diode)**



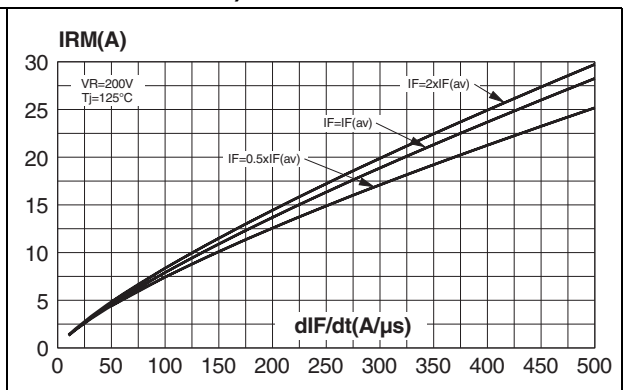
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



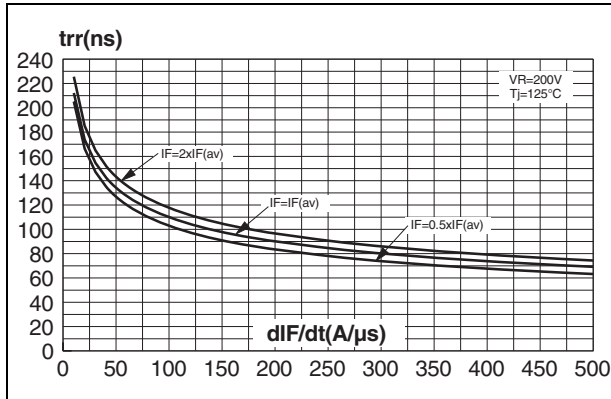
**Figure 2. Forward voltage drop versus forward current (maximum values, per diode)**



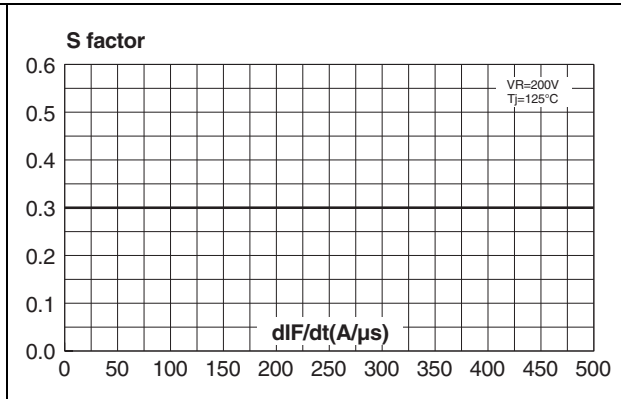
**Figure 4. Peak reverse recovery current versus diF/dt (90% confidence, per diode)**



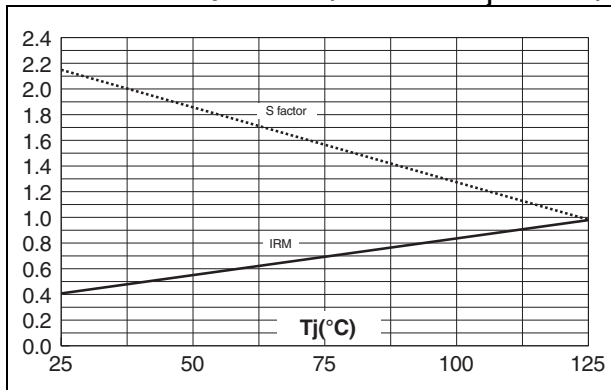
**Figure 5. Reverse recovery time versus  $dI_F/dt$  (90% confidence, per diode)**



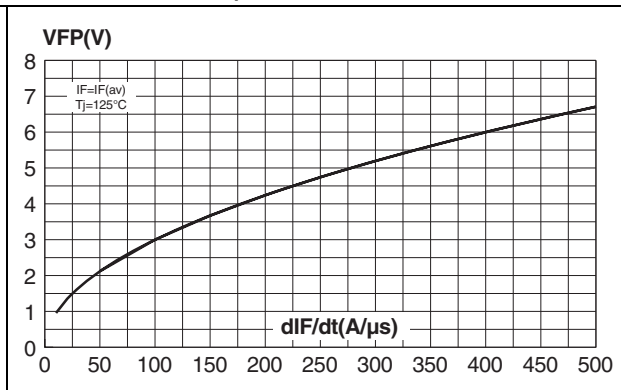
**Figure 6. Softness factor ( $t_b/t_a$ ) versus  $dI_F/dt$  (typical values, per diode)**



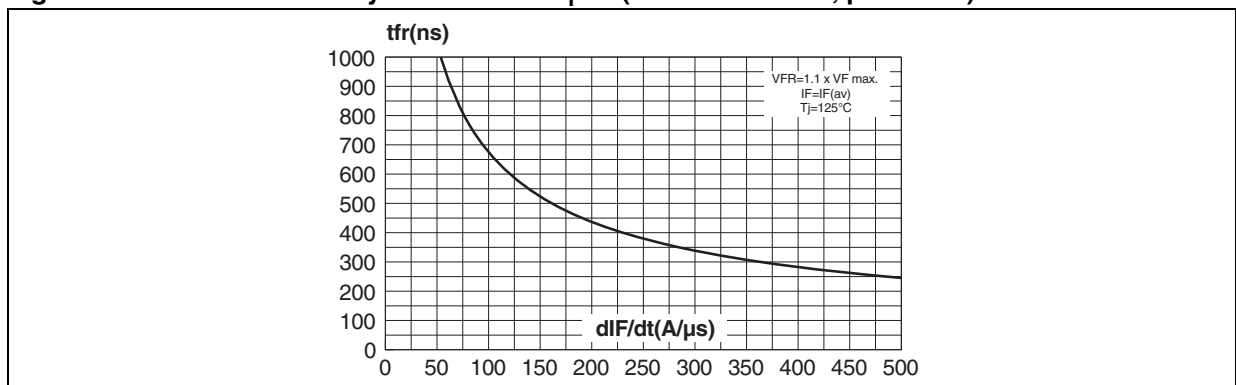
**Figure 7. Relative variation of dynamic parameters versus junction temperature (reference:  $T_j = 125^\circ C$ )**



**Figure 8. Transient peak forward voltage versus  $dI_F/dt$  (90% confidence, per diode)**



**Figure 9. Forward recovery time versus  $dI_F/dt$  (90% confidence, per diode)**



## 2 Package information

- Cooling method: by conduction (C)
- Recommended torque value: 0.9 to 1.2 N·m
- Epoxy meets UL 94,V0

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](http://www.st.com).

**Table 6. ISOTOP dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	11.80	12.20	0.465	0.480
A1	8.90	9.10	0.350	0.358
B	7.8	8.20	0.307	0.323
C	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
E	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
P	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

### 3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH16003TV1	STTH16003TV1	ISOTOP	27 g (without screws)	10 (with screws)	Tube

### 4 Revision history

Table 8. Document revision history

Date	Revision	Description of changes
Oct-1999	4D	Last issue.
25-Jun-2008	5	Reformatted to current standards. Corrected marking in <a href="#">Table 7</a>

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