STTH16003

High frequency secondary rectifier

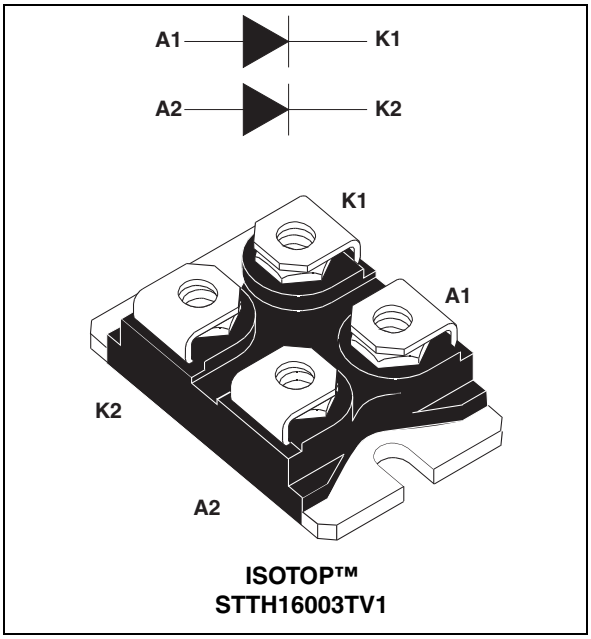
Features

- 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.



ISOTOP™
STTH16003TV1

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

TM: ISOTOP is a registered trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode, T_{amb} = 25 °C unless otherwise stated)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			300	V
$I_{F(RMS)}$	RMS forward current			180	A
$I_{F(AV)}$	Average forward current	Tc = 85°C δ = 0.5	Per diode Per device	60 160	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms Sinusoidal		800	A
I_{RSM}	Non repetitive peak reverse current	t_p = 100 µs square		5	A
T_{stg}	Storage temperature range			-55 to + 150	°C
T_j	Maximum operating junction temperature			150	°C

Table 3. Thermal parameters

Symbol	Parameter		Maximum	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.7	°C/W
		Total	0.4	
$R_{th(c)}$	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously:

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

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	V_R = 300 V			200	µA
		T_j= 125 °C			0.2	2	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 80 A			1.2	V
		T_j = 125 °C			0.8	0.95	

1. Pulse test: t_p = 5 ms, δ < 2 %
2. Pulse test: t_p = 380 µs, δ < 2 %

1. to evaluate the maximum conduction losses use the following equation:
   $P = 0.75 \times I_{F(AV)} + 0.0025\ I_{F^2(RMS)}$

Table 5. Recovery characteristics

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

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

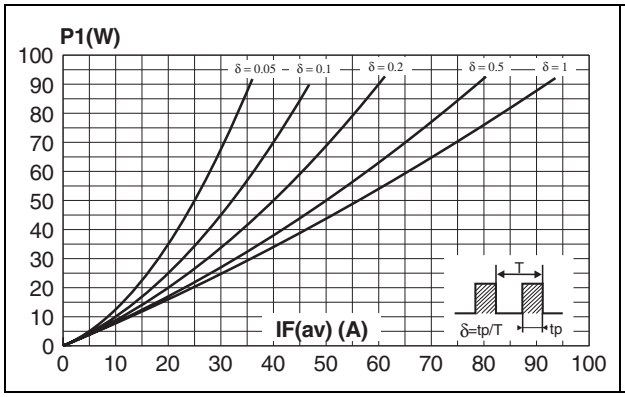


Figure 2. Forward voltage drop versus forward current (maximum values, per diode)

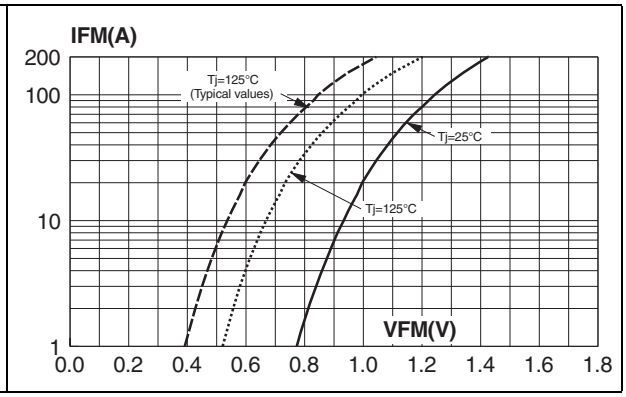


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

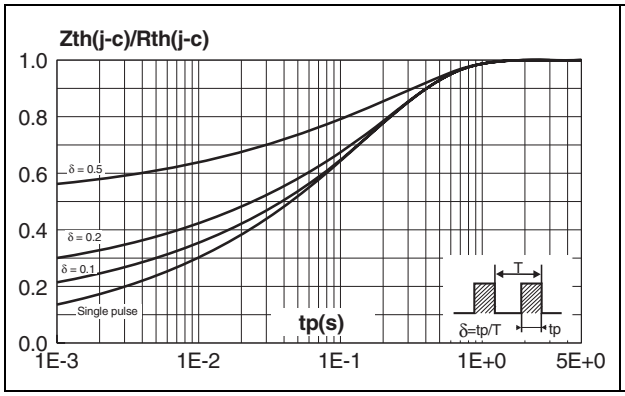


Figure 4. Peak reverse recovery current versus dI_F/dt (90% confidence, per diode)

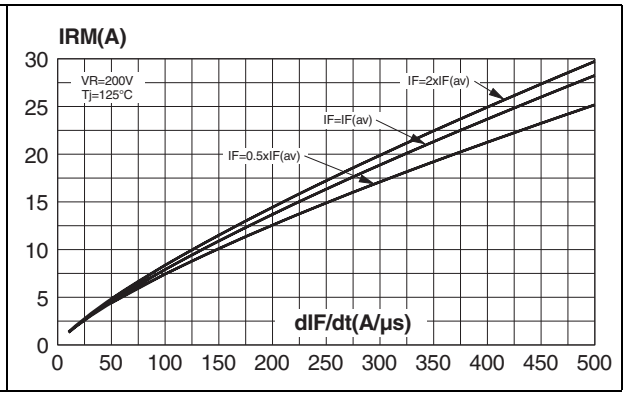


Figure 5. Reverse recovery time versus dI_F/dt (90% confidence, per diode)

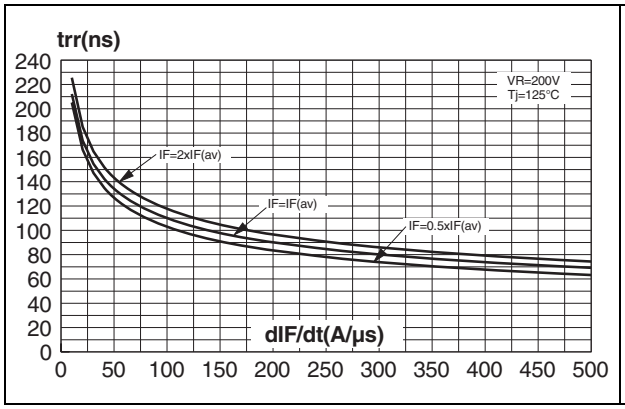


Figure 6. Softness factor (tb/ta) versus dI_F/dt (typical values, per diode)

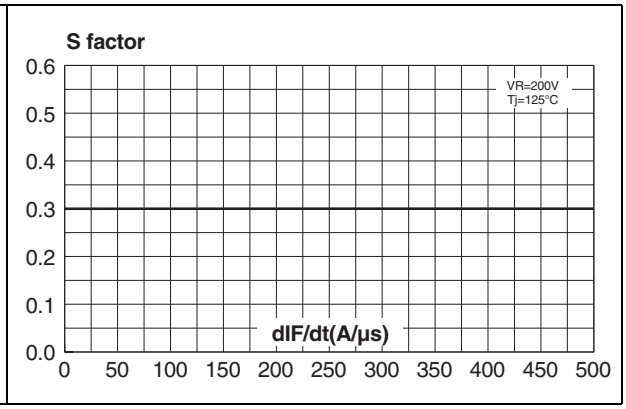


Figure 7. Relative variation of dynamic parameters versus junction temperature (reference: T_j = 125°C)

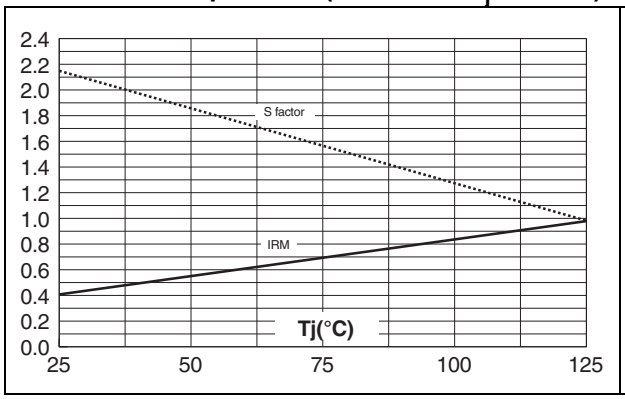


Figure 8. Transient peak forward voltage versus dI_F/dt (90% confidence, per diode)

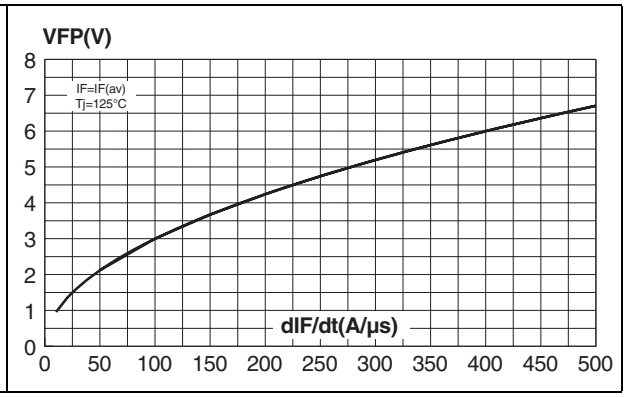
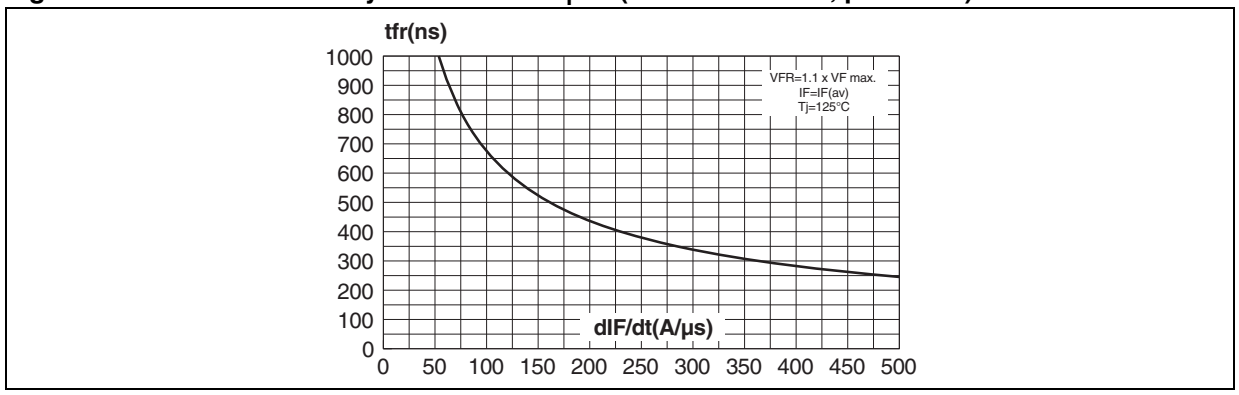


Figure 9. Forward recovery time versus dI_F/dt (90% confidence, per diode)

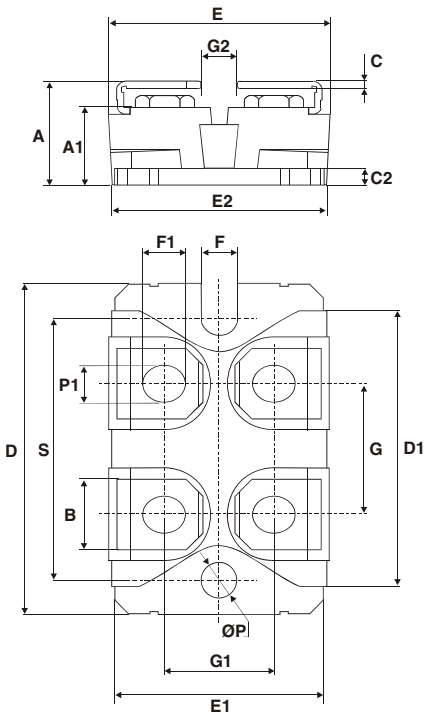


2 Package information

- 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*.

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 *Table 7*

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com