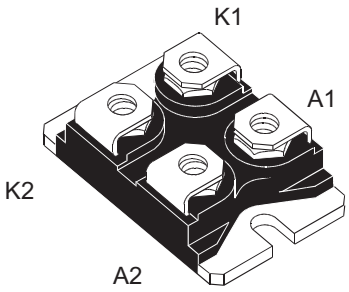
STTH20004TV1

Ultrafast high voltage rectifier

Datasheet - production data



ISOTOP
STTH20004TV1

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	Up to 2 x 120 A
V_{RRM}	400 V
T_j(max)	150 °C
V_F (typ)	0.83 V
t_{rr} (max)	60 ns

Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- Insulated package:
  - Electrical insulation = 2500 V rms
  - Capacitance = 189 pF
- ECOPACK®2 compliant component

Description

The STTH20004TV1 uses ST new 400 V technology and is specially suited for use in switching power supplies, welding equipment, and industrial applications, as an output rectification diode.

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			400	V
$I_{F(RMS)}$	Forward rms current			200	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	T_c = 75 °C	Per diode	100	A
		T_c = 55 °C	Per diode	120	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms Sinusoidal		900	A
T_{stg}	Storage temperature range			-55 to + 150	°C
T_j	Maximum operating junction temperature			150	°C

Table 3. Thermal parameter

Symbol	Parameter		Maximum	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.60	°C/W
		Total	0.35	
$R_{th(c)}$	Coupling		0.10	

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	$V_R = V_{RRM}$			100	µA
		T_j = 125 °C			100	1000	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 100 A			1.2	V
		T_j = 150 °C			0.83	1.0	

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

To evaluate the maximum conduction losses use the following equation:
$P = 0.8 \times I_{F(AV)} + 0.002\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic characteristics

Symbol	Parameter		Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, dI_F/dt = 50 A/µs, V_R = 30 V		75	100	ns
			I_F = 1 A, dI_F/dt = 200 A/µs, V_R = 30 V		45	60	
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 100 A, dI_F/dt = 200 A/µs V_{FR} = 1.1 x V_{Fmax}			800	ns
V_{FP}	Forward recovery voltage				2.6		V
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 100 A, dI_F/dt = 100 A/µs, V_R = 200 V			18	A
S_{factor}					0.4		-

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

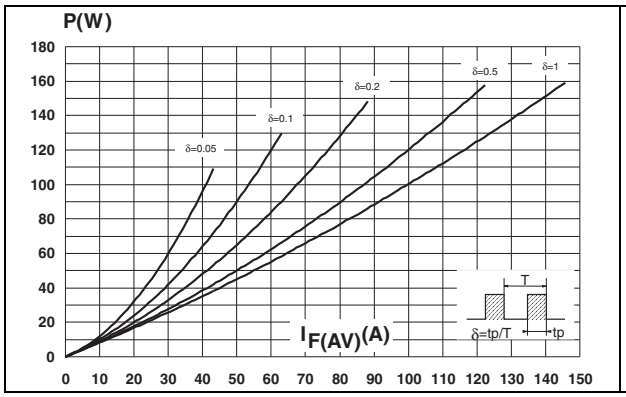


Figure 2. Forward voltage drop versus forward current (per diode)

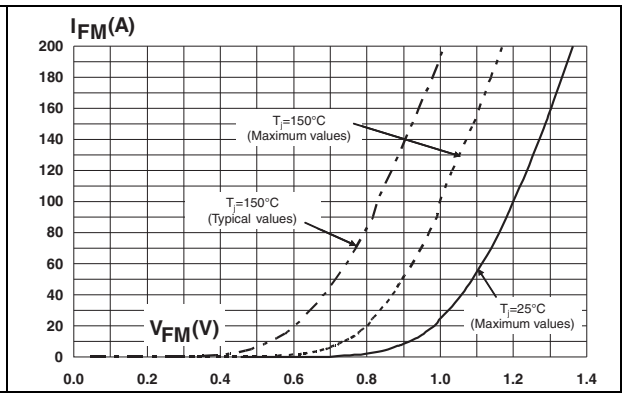


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

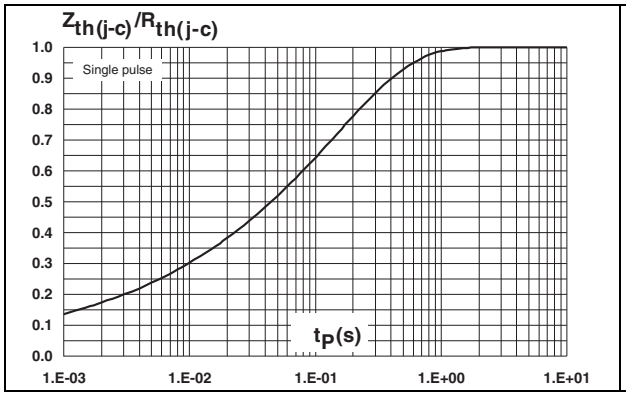


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

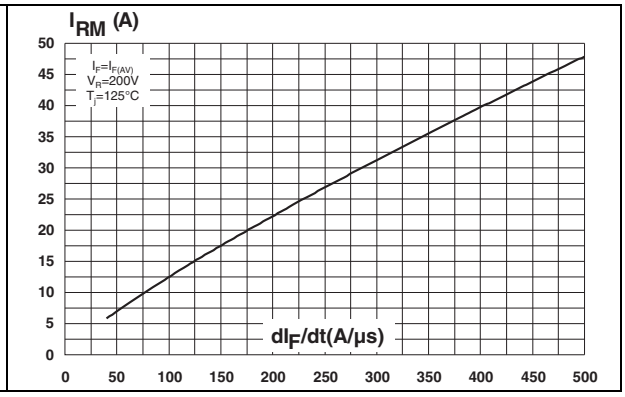


Figure 5. Reverse recovery time versus dI_F/dt (typical values, per diode)

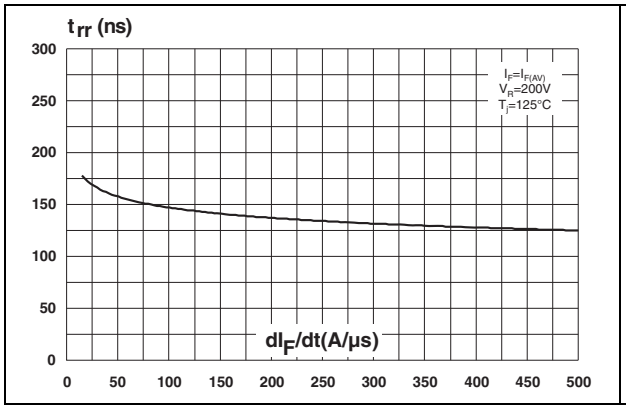


Figure 6. Reverse recovery charges versus dI_F/dt (typical values, per diode)

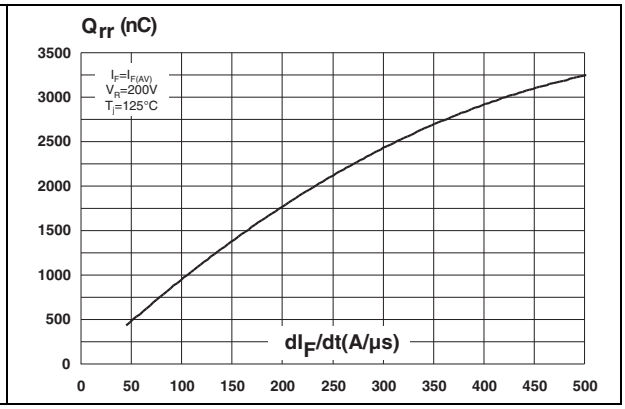


Figure 7. Reverse recovery time versus dI_F/dt (typical values, per diode)

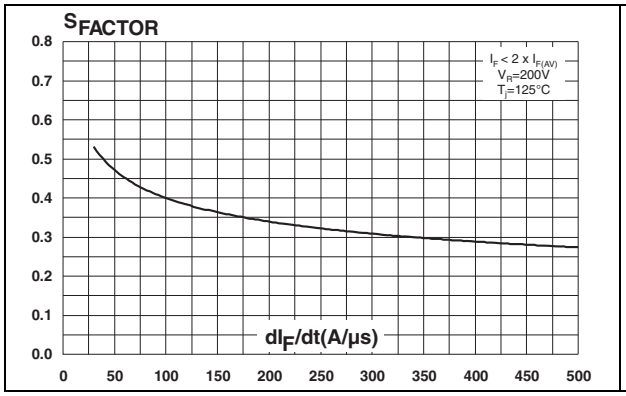


Figure 8. Relative variations of dynamic parameters versus junction temperature

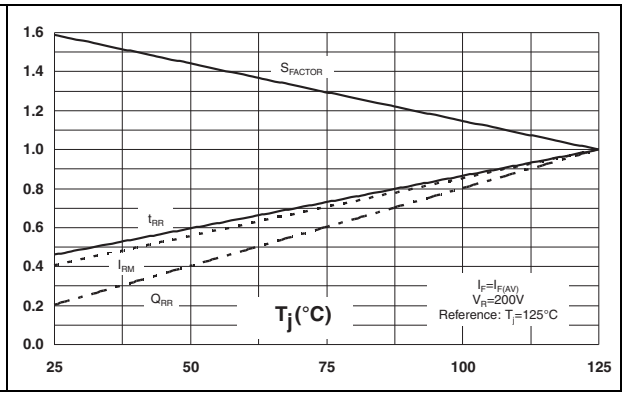


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values, per diode)

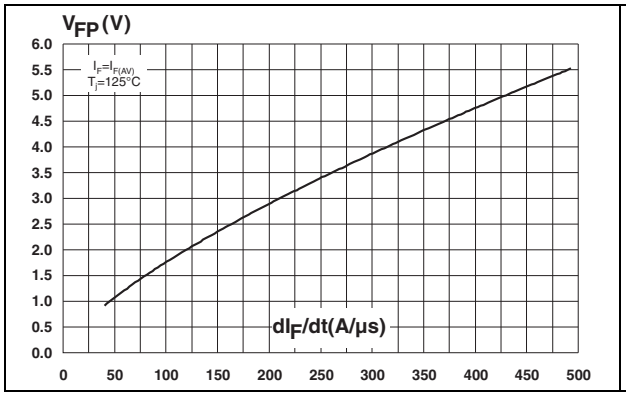


Figure 10. Forward recovery time versus dI_F/dt (typical values, per diode)

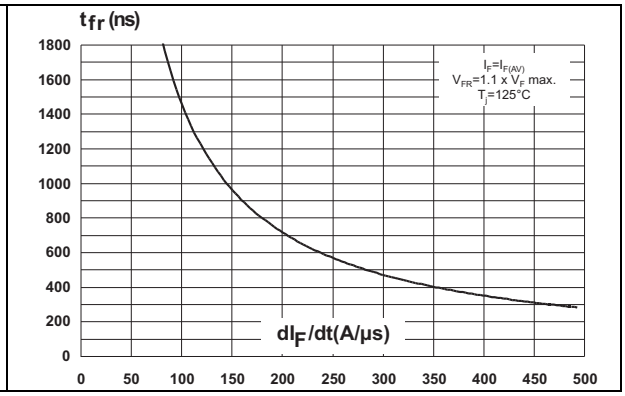
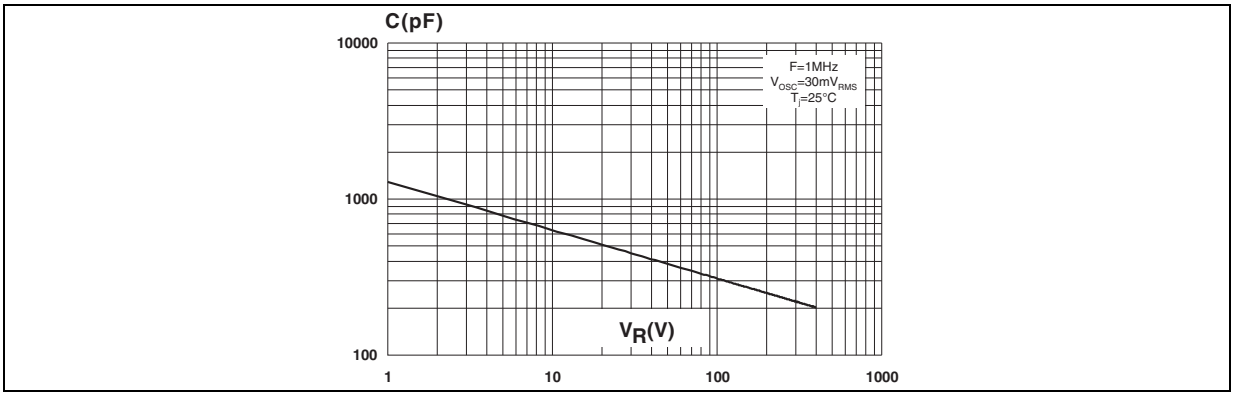


Figure 11. Reverse recovery time versus dI_F/dt (typical values, per diode)



2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Cooling method: by conduction (C)

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com.* ECOPACK® is an ST trademark.

Figure 12. ISOTOP dimension definitions

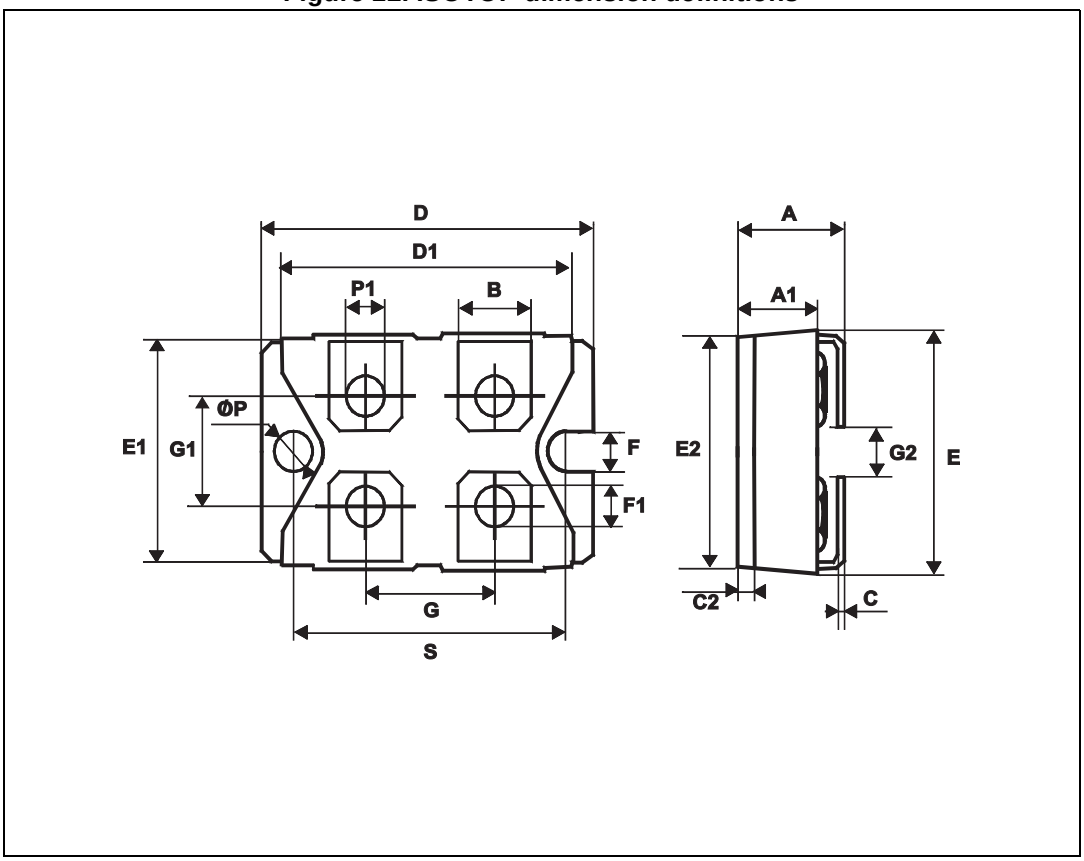


Table 6. ISOTOP dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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			0.976	
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[1]	Delivery mode
STTH20004TV1	STTH20004TV1	ISOTOP	27 g (without screws)	10 (with screws)	Tube

1. This product is supplied with 40 terminal screws and washers for each tube. The screws and washers are supplied in a separate pack with the order.

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
18-Oct-2005	1	First issue.
15-Sep-2011	2	Added insulated package information in *Features*.
20-Jun-2014	3	Updated ECOPACK® statement, *Table 2* and *Table 3*.

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.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER’S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR “AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL” INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

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 - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com