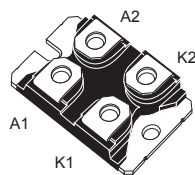
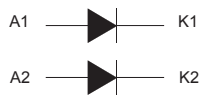


300 V ultrafast high voltage rectifier



ISOTOP

Features

- Combines recovery and reverse voltage performance
- Ultrafast, soft and noise-free recovery
- Low inductance and low capacitance allow simpler layout
- Insulated package ISOTOP:
 - Insulated voltage: 2500 V_{RMS} sine
- ECOPACK®2 compliant

Applications

- Switching diode
- Welding equipments
- Telecom power

Description

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

Packaged in ISOTOP, the **STTH20003** is intended for use in low voltage, high frequency inverters, free wheeling operation, welding equipment and Telecom power supplies.

Product status link	
STTH20003	
Product summary	
Symbol	Value
$I_{F(AV)}$	2 x 100 A
V_{RRM}	300 V
T_j (max.)	150 °C
V_F (typ.)	0.80 V
t_{rr} (max.)	90 ns

1 Characteristics

Table 1. Absolute ratings (limiting values, per diode at $T_{amb} = 25\text{ °C}$, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		300	V
$I_{F(RMS)}$	Forward rms current		180	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$, square wave	$T_C = 110\text{ °C}$	100	A
		$T_C = 90\text{ °C}$	200	
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	1000	A
T_{stg}	Storage temperature range		-55 to +150	°C
T_j	Maximum operating junction temperature		150	°C

Table 2. Thermal resistance parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.55	°C/W
		Total	0.35	
$R_{th(c)}$	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 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	-		200	μA
		$T_j = 125\text{ °C}$	-	0.2	2	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	-		1.20	V
		$T_j = 150\text{ °C}$	-	0.80	0.95	

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

2. Pulse test: $t_p = 380\text{ μs}$, $\delta < 2\%$

To evaluate the maximum conduction losses, use the following equation:

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

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

Table 4. Dynamic characteristics (per diode)

Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ }^{\circ}\text{C}$	$I_F = 0.5\text{ A}$, $I_{rr} = 0.25\text{ A}$, $I_R = 1\text{ A}$	-	50		ns
			$I_F = 1\text{ A}$, $dI_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-		90	
I_{RM}	Reverse recovery current	$T_j = 125\text{ }^{\circ}\text{C}$	$I_F = 100\text{ A}$, $dI_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 200\text{ V}$	-		18	A
S_{factor}	Softness factor			-	0.3		
t_{fr}	Forward recovery time	$T_j = 25\text{ }^{\circ}\text{C}$	$I_F = 100\text{ A}$, $dI_F/dt = 200\text{ A}/\mu\text{s}$, $V_{FR} = 1.1 \times V_{F(max)}$	-		1400	ns
V_{FP}	Forward recovery voltage			-		5	V

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current (square waveform)

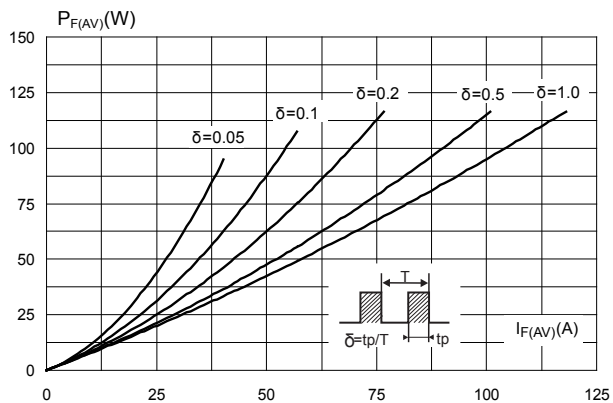


Figure 2. Forward voltage drop versus forward current (typical values)

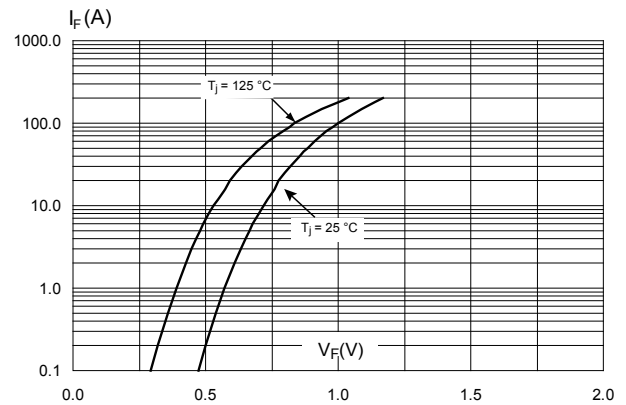


Figure 3. Forward voltage drop versus forward current (maximum values)

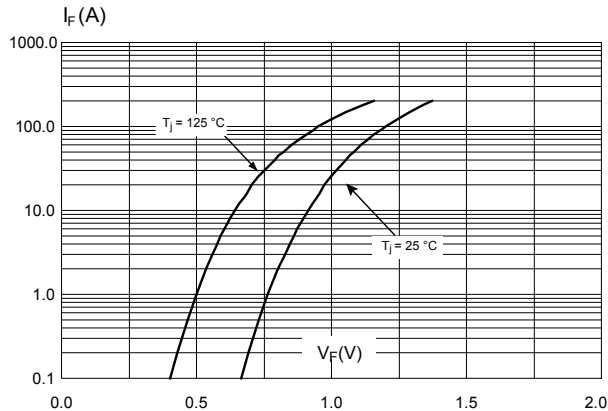


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

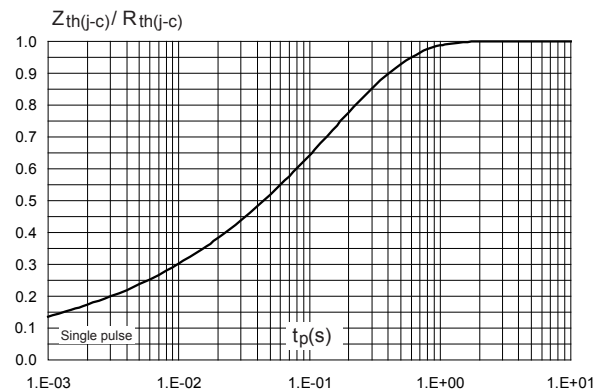


Figure 5. Peak reverse recovery current versus dI_F/dt (typical values)

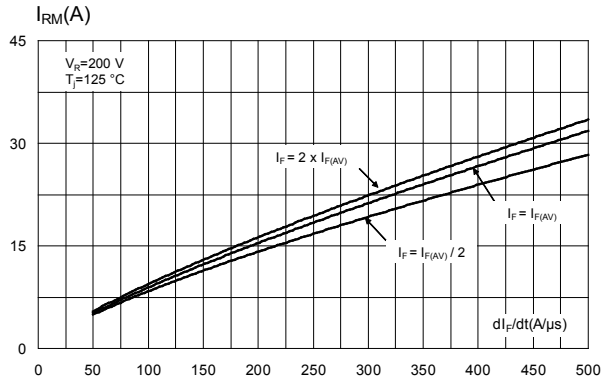


Figure 6. Reverse recovery time versus dI_F/dt (typical values)

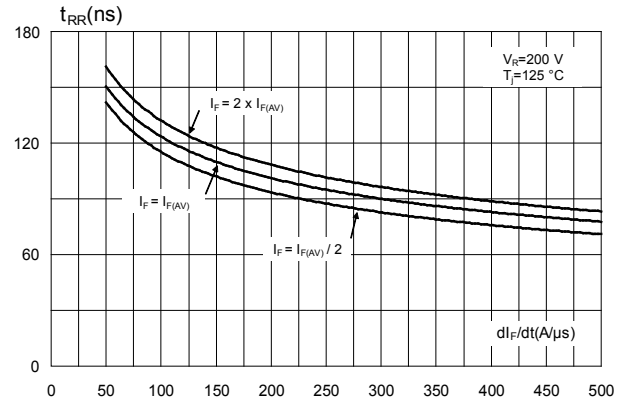


Figure 7. Reverse recovery softness factor versus dI_F/dt (typical values)

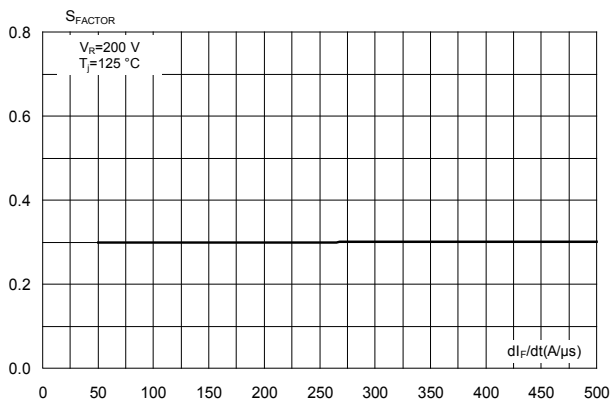


Figure 8. Relative variations of dynamic parameters versus junction temperature

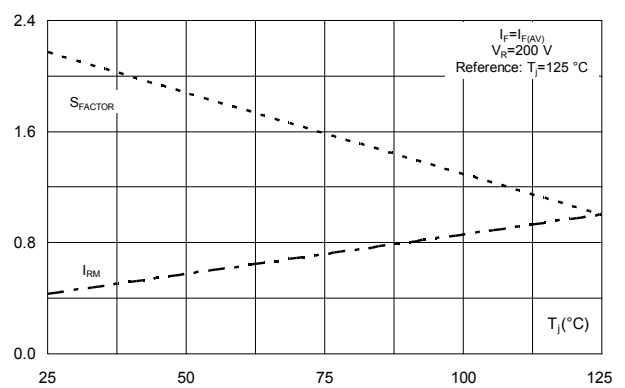
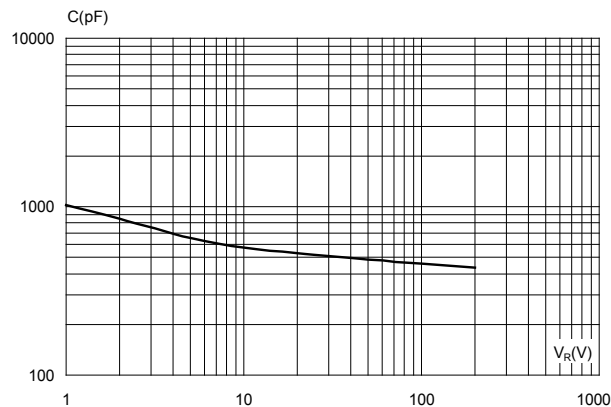


Figure 9. Junction capacitance versus reverse voltage applied (typical values)



2 Package information

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.

2.1 Isotop package information

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

STMicroelectronics strongly recommend the use of the screws delivered with this product.
 The use of any other screws is entirely at the user's own risk and will invalidate the warranty.

Figure 10. ISOTOP package outline

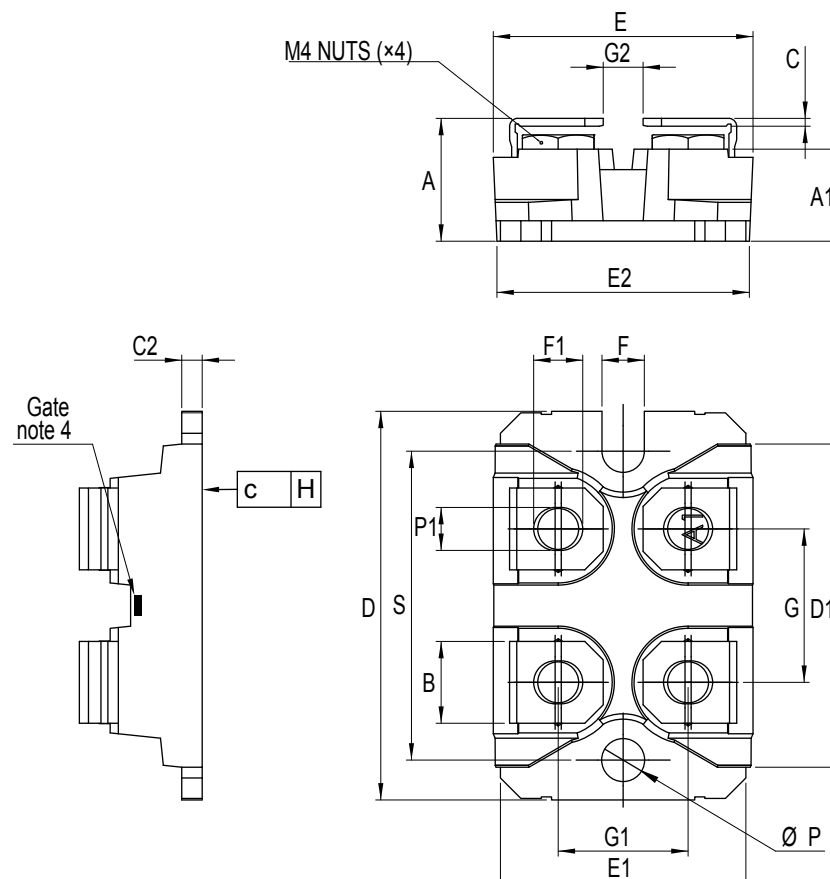


Table 5. ISOTOP package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	11.80	12.20	0.460	0.480
A1	8.90	9.10	0.350	0.358
B	7.80	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
H	-0.05	0.10	-0.002	0.004
Diam P	4.00	4.30	0.157	0.169
P1	4.00	4.40	0.157	0.173
S	30.10	30.30	1.185	1.193

3 Ordering Information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH20003TV	STTH20003TV	ISOTOP	27 g without screws	10 with screws	Tube

Revision history

Table 7. Document revision history

Date	Version	Changes
1999	2C	First issue.
5-Sep-2006	2	Reformatted to current standards. Thermal resistance updated in Table 2.
07-Jun-2018	3	Updated features in cover page and Table 1. Absolute ratings (limiting values, per diode at $T_{amb} = 25\text{ °C}$, unless otherwise specified). Updated Section 1.1 Characteristics (curves).

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics – All rights reserved