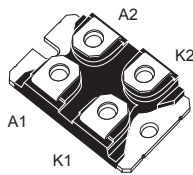
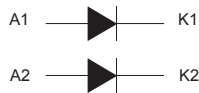


## 300 V ultrafast high voltage rectifier


**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<sub>RMS</sub> 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	
<a href="#">STTH20003</a>	
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	$T_j = 25\text{ °C}$	$V_R = 300\text{ V}$	-		200	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	0.2	2	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 100\text{ A}$	-		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:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

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

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

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

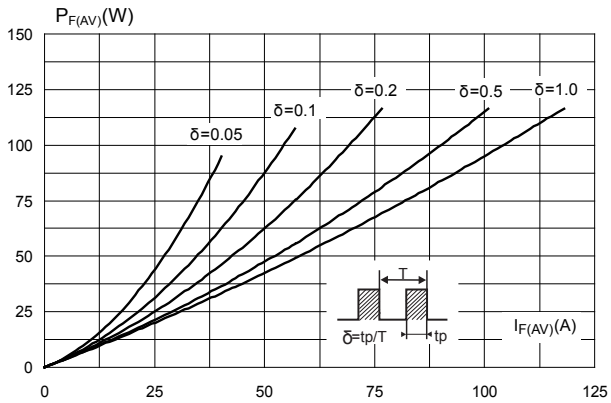
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

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

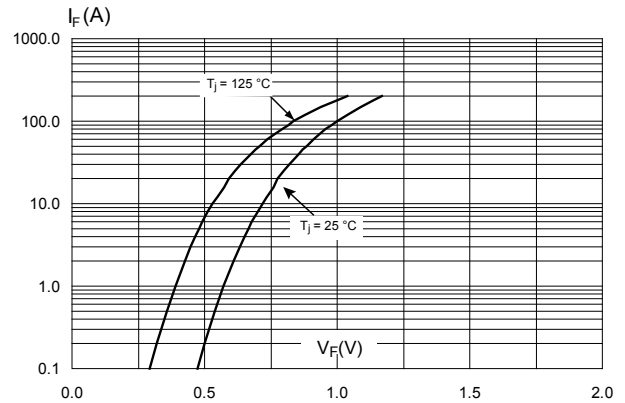
Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$ , $I_R = 1\text{ A}$	-	50		ns
			$I_F = 1\text{ A}$ , $dI_F/dt = -50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-		90	
$I_{RM}$	Reverse recovery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

### 1.1 Characteristics (curves)

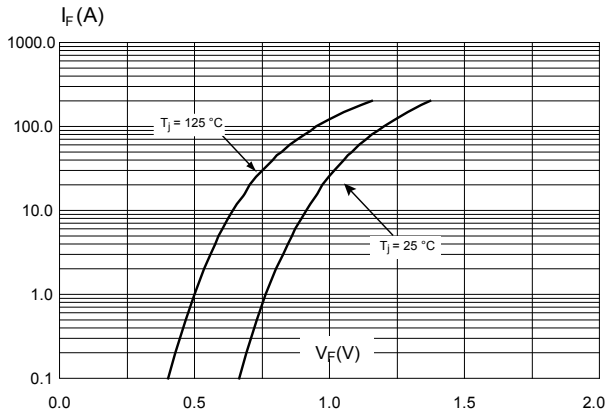
**Figure 1. Average forward power dissipation versus average forward current (square waveform)**



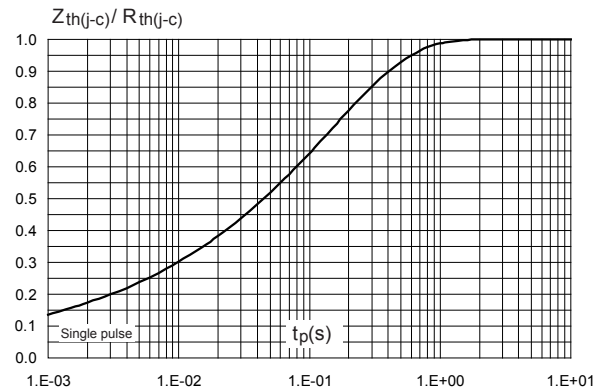
**Figure 2. Forward voltage drop versus forward current (typical values)**



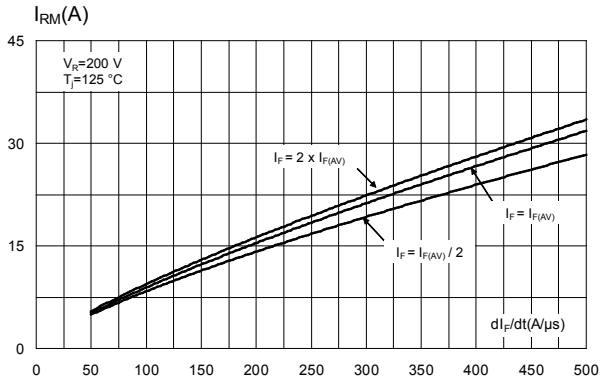
**Figure 3. Forward voltage drop versus forward current (maximum values)**



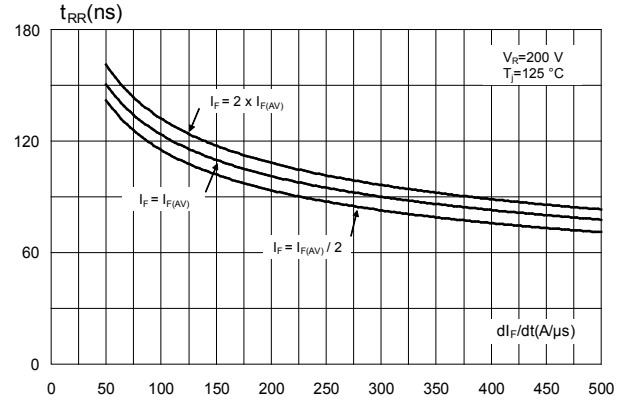
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



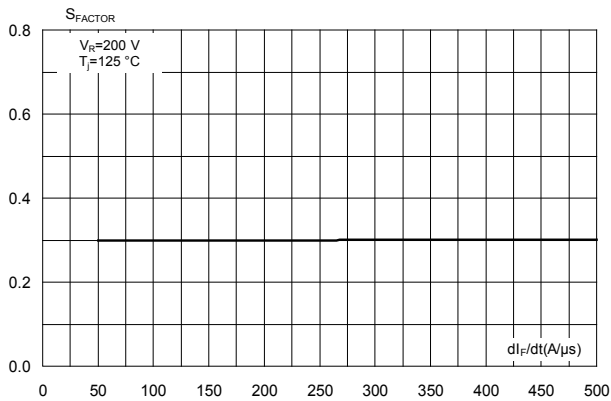
**Figure 5. Peak reverse recovery current versus  $dI_F/dt$  (typical values)**



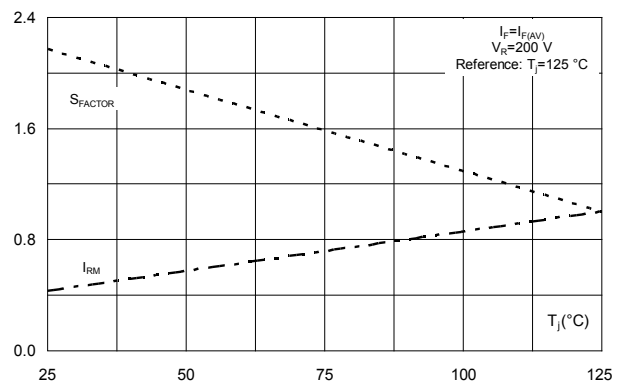
**Figure 6. Reverse recovery time versus  $dI_F/dt$  (typical values)**



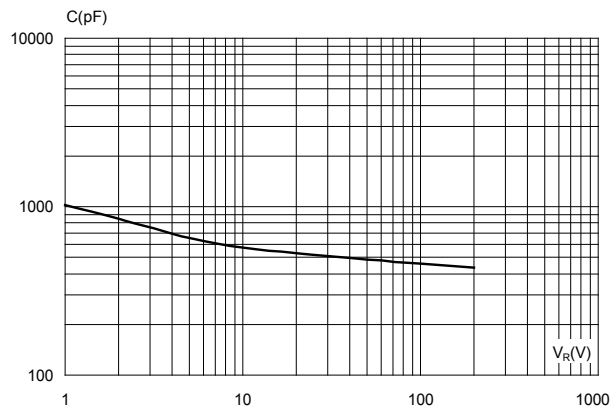
**Figure 7. Reverse recovery softness factor versus  $dI_F/dt$  (typical values)**



**Figure 8. Relative variations of dynamic parameters versus junction temperature**



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



## 2 Package information

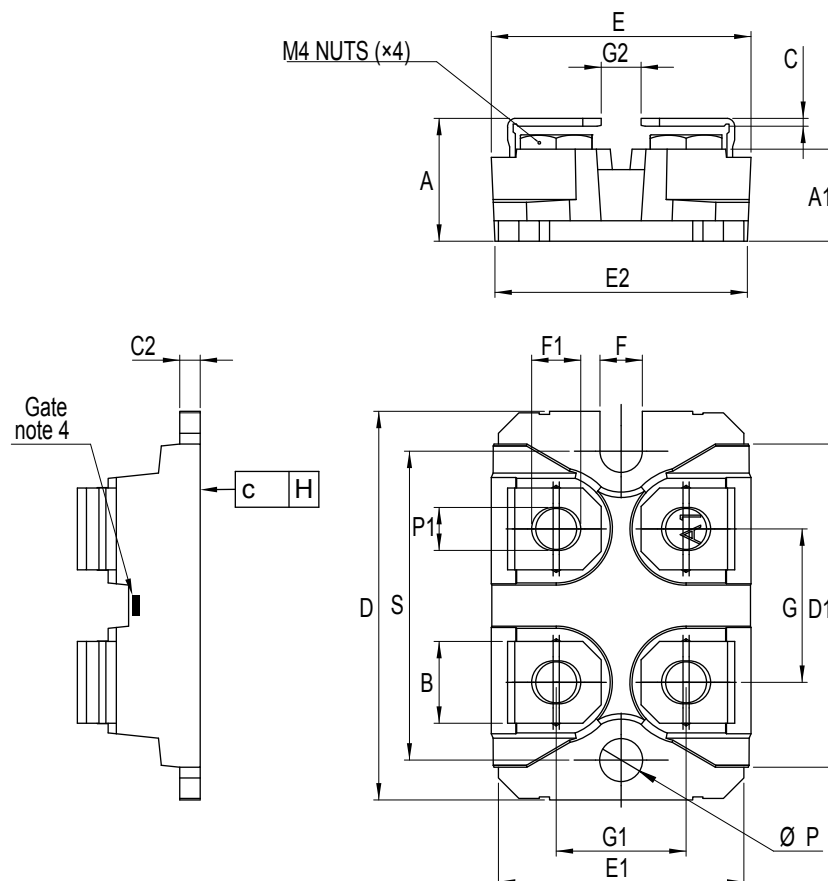
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 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).

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