

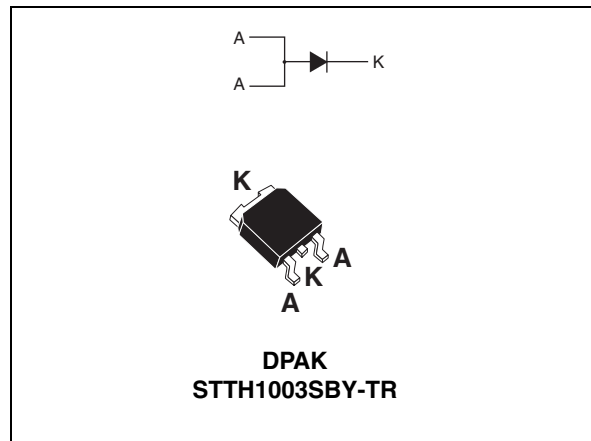
### Features

- Ultrafast recovery
- Low power losses
- High surge capability
- Low leakage current
- High junction temperature
- AEC-Q101 qualified

### Description

The STTH1003S-Y is an ultrafast recovery power rectifier dedicated to energy recovery in automotive applications.

The STTH1003S-Y is especially designed for the clamping function in an energy recovery block. The compromise between forward voltage drop and recovery time offers optimized performances.



**Table 1. Device summary**

$I_{F(AV)}$	10 A
$V_{RRM}$	300 V
$t_{rr}$ (typ)	13 ns
$T_j$	175 °C
$V_F$ (typ)	0.9 V

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		300	V
$I_{F(RMS)}$	Forward rms current		20	A
$I_{F(AV)}$	Average forward current	$T_c = 150\text{ °C } \delta = 0.5$	10	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	100	A
$I_{RSM}$	Non repetitive avalanche current	$t_p = 20\text{ }\mu\text{s square}$	4	A
$T_{stg}$	Storage temperature range		-65 to + 175	°C
$T_j$	Operating junction temperature range		-40 to + 175	°C

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	4	°C/W

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	-	10	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	10	100	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	-	1.30	V
		$T_j = 125\text{ °C}$		-	0.9	1.1	

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

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

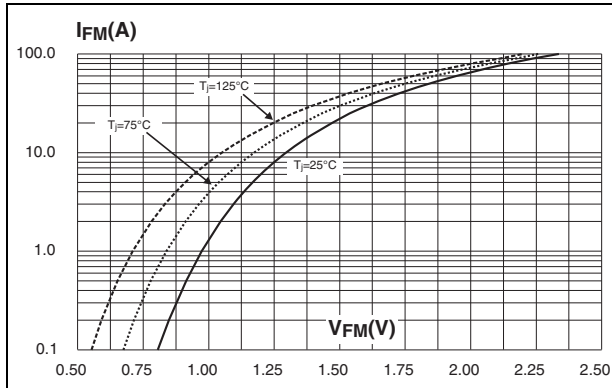
To evaluate the conduction losses use the following equation:

$$P = 0.86 \times I_{F(AV)} + 0.024 I_{F(RMS)}^2$$

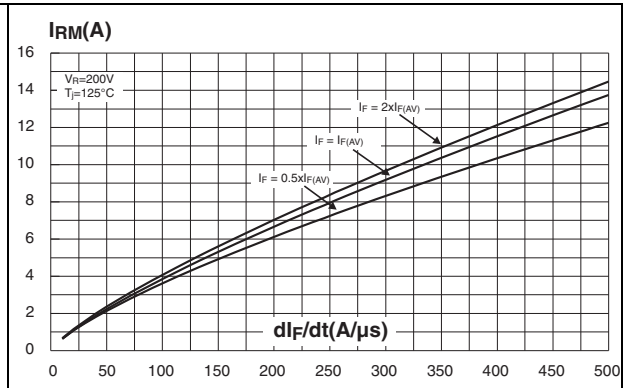
**Table 5. Recovery characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$	-	13	17	ns
			$I_F = 1\text{ A}, V_R = 30\text{ V}$ $di_F/dt = -50\text{ A}/\mu\text{s}$	-	28	35	
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 10\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$	-	-	200	ns
$V_{FP}$	Peak forward voltage	$T_j = 25\text{ °C}$	$I_F = 10\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	-	2.5	3.5	V
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 10\text{ A}, V_{CC} = 200\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	-	5.7	7.5	A
$S_{factor}$	Softness factor			-	0.3	-	

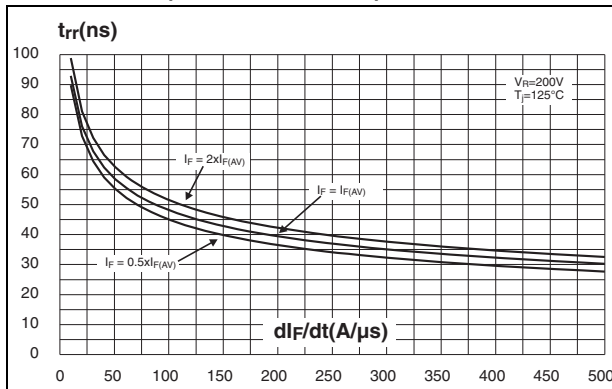
**Figure 1. Forward voltage drop versus current (maximum values)**



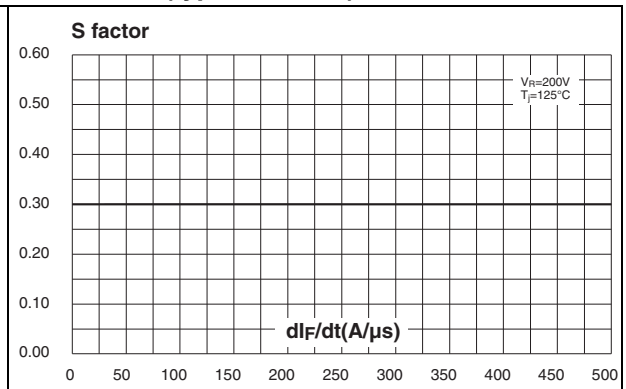
**Figure 2. Peak reverse recovery current versus  $di_F/dt$  (90% confidence)**



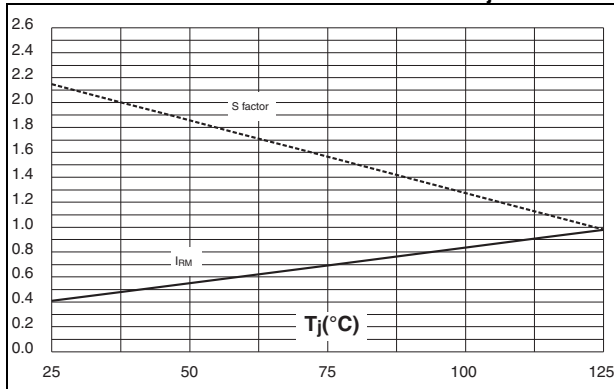
**Figure 3. Reverse recovery time versus  $di_F/dt$  (90% confidence)**



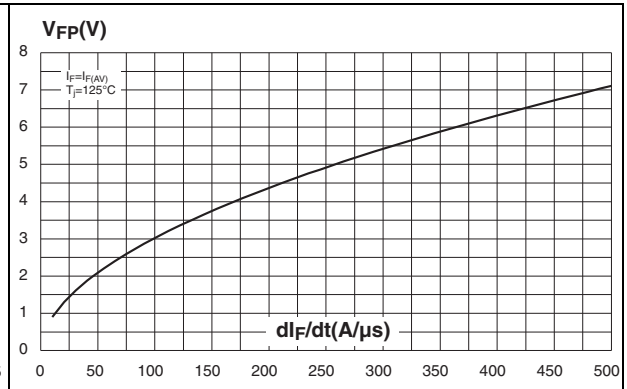
**Figure 4. Softness factor versus  $di_F/dt$  (typical values)**



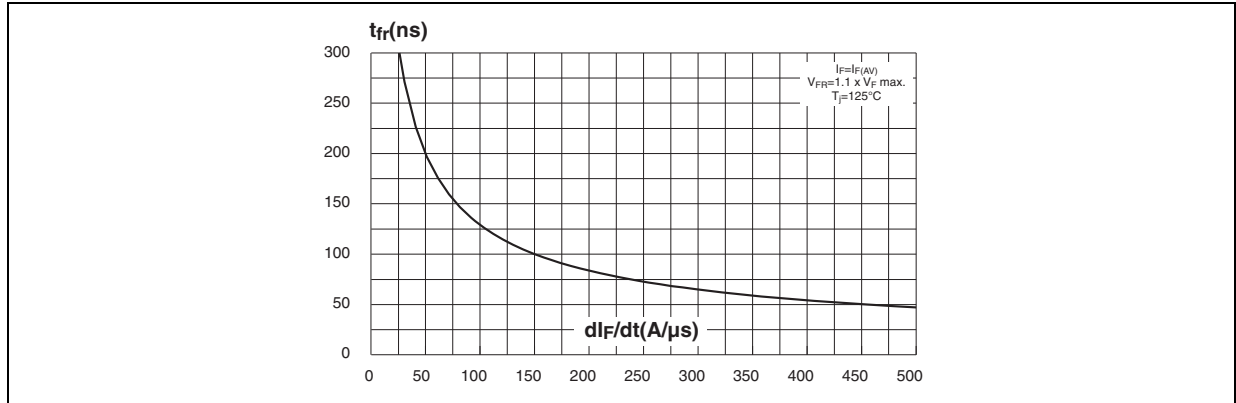
**Figure 5. Relative variations of dynamic parameters versus junction temperature (reference:  $T_j = 125\text{ }^\circ\text{C}$ )**



**Figure 6. Transient peak forward voltage versus  $dI_F/dt$  (90% confidence)**



**Figure 7. Forward recovery time versus  $dI_F/dt$  (90% confidence)**



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction

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.

Table 6. DPAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

### 3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1003SBY-TR	STTH1003SY	DPAK	0.3 g	2500	Tape and reel

### 4 Revision history

Table 8. Document revision history

Date	Revision	Changes
24-Oct-2012	1	Initial release.

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