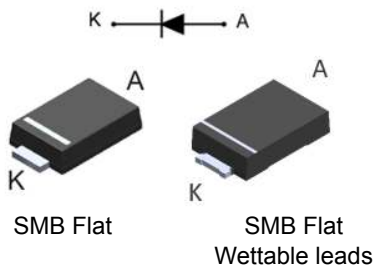



## Automotive 1 A - 600 V turbo 2 ultrafast rectifier



## Features

- AEC-Q101 qualified 
- Ultrafast recovery
- Low switching losses
- High surge capability
- Low leakage current
- High junction temperature
- [ECOPACK2](#) or [ECOPACK3](#) compliant component on demand
- $V_{RRM}$  guaranteed from -40 to +175 °C

## Description

The [STTH1R06-Y](#) is an ultrafast recovery power rectifier dedicated to energy recovery in automotive application housed in SMB Flat to improve space saving. It is especially designed for clamping function in energy recovery block.

The compromise between forward voltage drop and recovery time offers optimized performances.



## Product status link

[STTH1R06-Y](#)

## Product summary

$I_{F(AV)}$	1 A
$V_{RRM}$	600 V
$T_j$ (max.)	175 °C
$V_F$ (typ.)	1.1 V
$T_{rr}$ (typ.)	30 ns

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at  $T_j = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Parameter	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage, $T_j = -40$ to $+175\text{ °C}$	600	V
$I_{F(AV)}$	Average forward current	$T_L = 135\text{ °C}$ , $\delta = 0.5$	1
$I_{FSM}$	Forward surge current	$t_p = 10\text{ ms}$	17
$T_{stg}$	Storage temperature range	-65 to $+175$	$^{\circ}\text{C}$
$T_j^{(1)}$	Operating temperature range	-40 to $+175$	$^{\circ}\text{C}$

1.  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to lead	21	$^{\circ}\text{C/W}$

**Table 3. Static electrical characteristic**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		1	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	10	75	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$	-		1.9	V
		$T_j = 150\text{ °C}$		-	1.1	1.4	

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

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

To evaluate the conduction losses use the following equation:

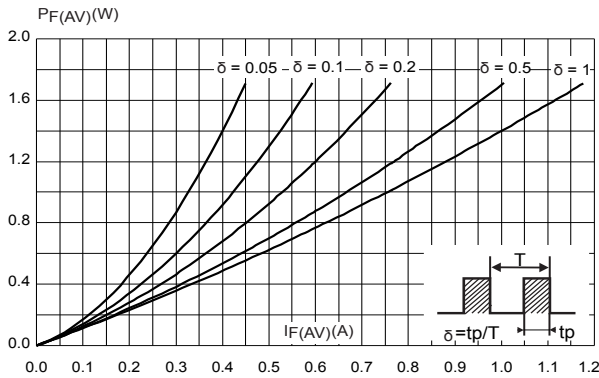
$$P = 1.1 \times I_{F(AV)} + 0.30 I_{F^2(RMS)}$$

**Table 4. Dynamic electrical characteristics**

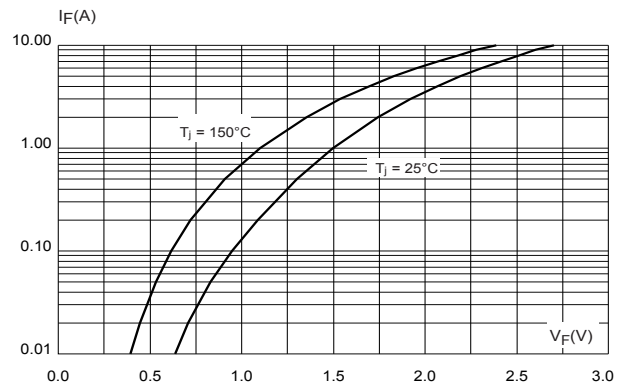
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$ ; $dI_F/dt = -50\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$	-	30	45	ns
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 3\text{ A}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $V_{FR} = 3.5\text{ V}$	-		90	
$V_{FP}$	Forward recovery voltage		$I_F = 2\text{ A}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$	-		8	V

## 1.1 Electrical characteristics (curves)

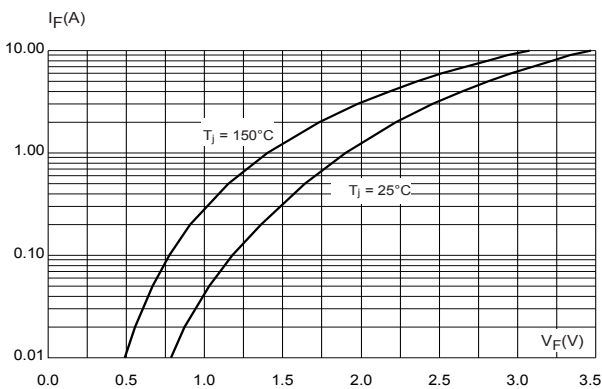
**Figure 1. Average forward power dissipation versus average forward current**



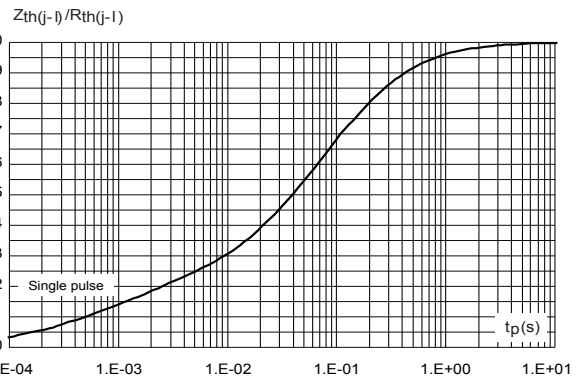
**Figure 2. Forward voltage drop versus forward current (typical values)**



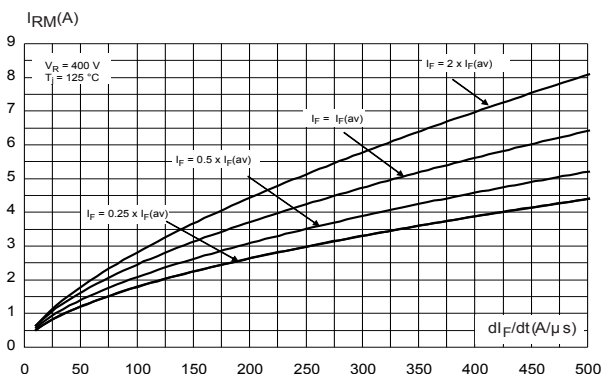
**Figure 3. Forward voltage drop versus forward current (maximum values)**



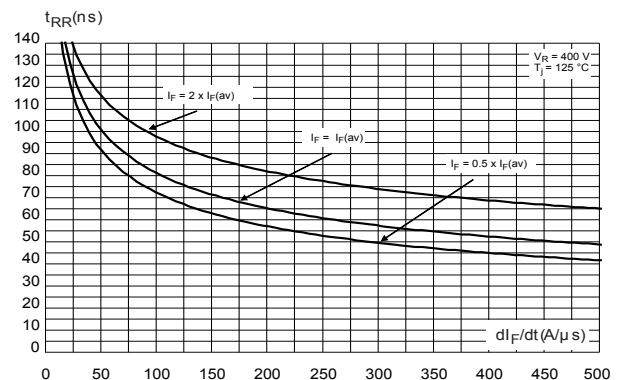
**Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration**



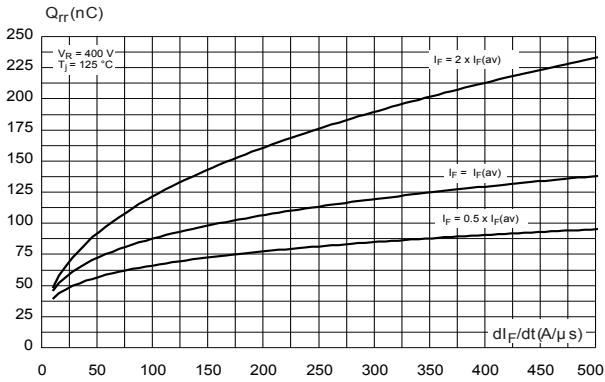
**Figure 5. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



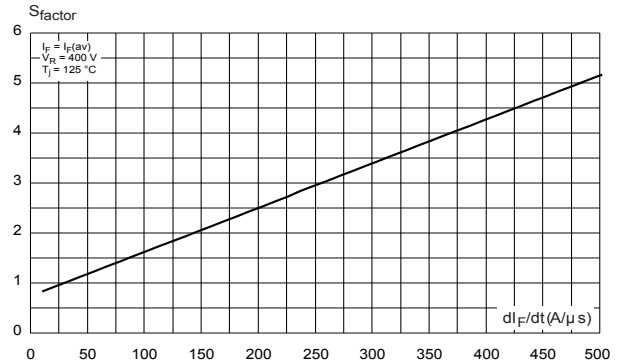
**Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)**



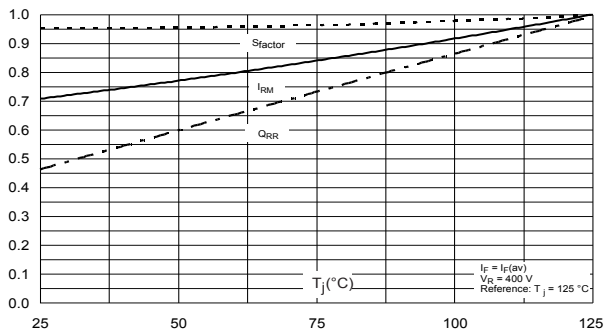
**Figure 7. Reverse recovery charges versus  $di_F/dt$  (typical values)**



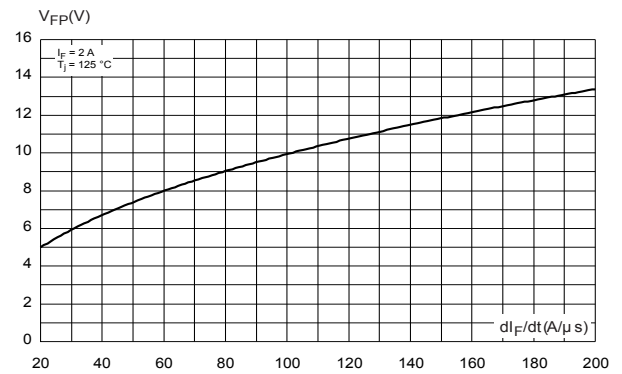
**Figure 8. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



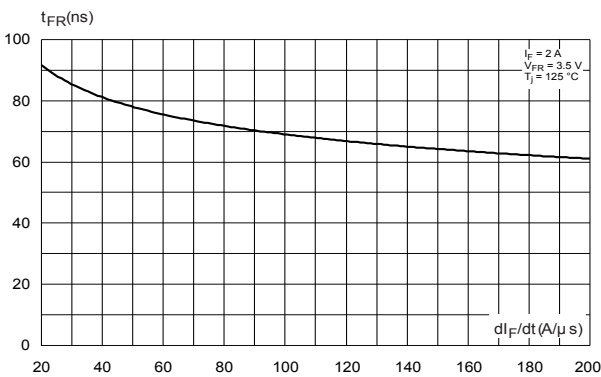
**Figure 9. Relative variation of dynamic parameters versus junction temperature**



**Figure 10. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



**Figure 11. Forward recovery time versus  $di_F/dt$  (typical values)**



**Figure 12. Junction capacitance versus reverse voltage applied (typical values)**

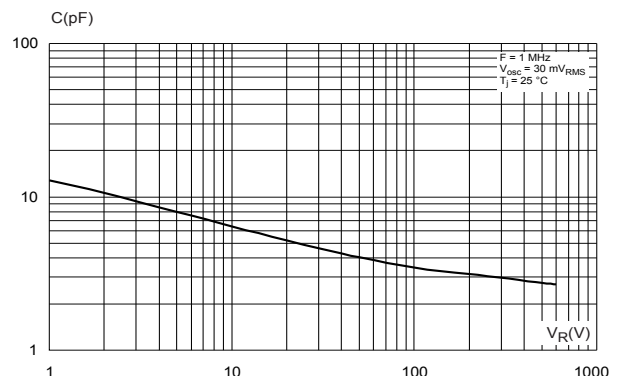
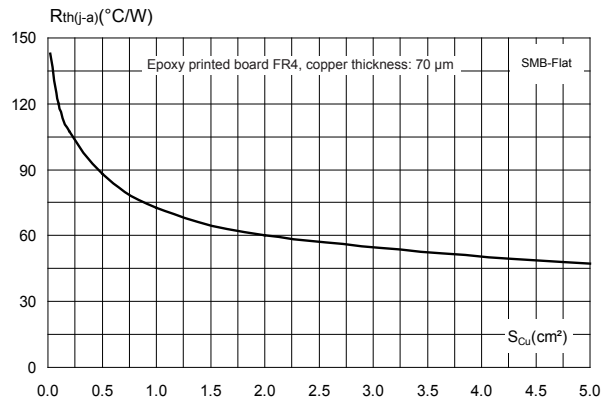


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead



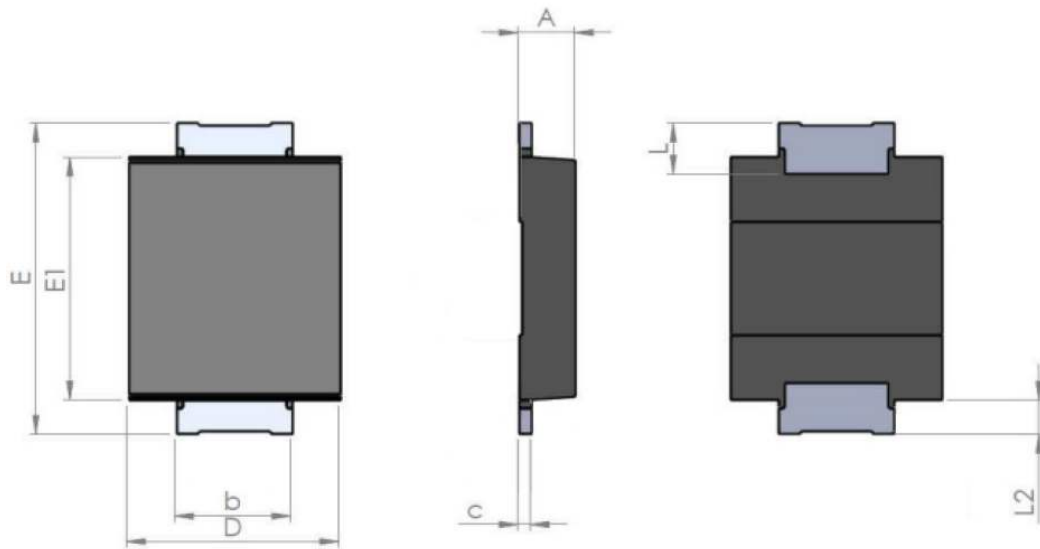
## 2 Package information

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 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

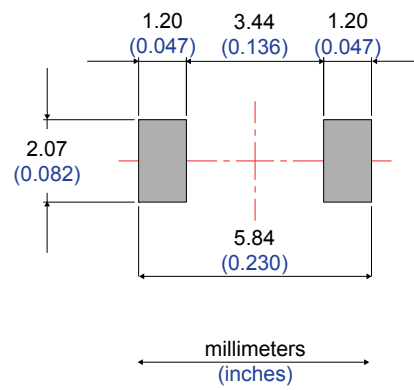
**Figure 14. SMB Flat package outline**



**Table 5. SMB Flat mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.043
b	1.95		2.20	0.077		0.087
c	0.15		0.40	0.006		0.016
D	3.30		3.95	0.130		0.156
E	5.10		5.60	0.200		0.220
E1	4.05		4.60	0.159		0.181
L	0.75		1.50	0.030		0.060
L2		0.60			0.024	

**Figure 15. Footprint recommendations, dimensions in mm (inches)**



### 3 Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH1R06UFY	F1R6Y	SMBflat	50 mg	5000	Tape and reel



## Revision history

**Table 6. Document revision history**

Date	Version	Changes
04-Aug-2014	1	Initial release.
26-Apr-2022	2	Updated <a href="#">Section 2.1</a> SMB Flat package information.

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