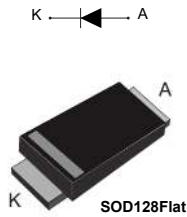



## Automotive 600 V, 1 A, turbo 2 ultrafast rectifier



## Features

- AEC-Q101 qualified 
- Ultrafast recovery
- $V_{RRM}$  600 V up to  $-40\text{ }^{\circ}\text{C}$
- Low power losses
- High surge capability
- Low leakage current
- High junction temperature
- PPAP capable
- ECOPACK<sup>®</sup>2 compliant component

## Applications

- Reverse polarity protection
- Clamping function
- Boost diode
- PFC

## Description

The [STTH1R06AFY](#) is an ultrafast recovery power rectifier dedicated to energy recovery in automotive application housed in SOD128Flat 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 performance.

Product status	
STTH1R06AFY	
Product summary	
$I_{F(AV)}$	1 A
$V_{RRM}$	600 V
$t_{rr}$	30 ns
$T_j$	175 $^{\circ}\text{C}$
$V_{F(typ.)}$	1.08 V

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)**

Symbol	Parameter		Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage (T <sub>j</sub> = -40 °C to +175 °C)		600	V
I <sub>F(AV)</sub>	Average forward current	T <sub>L</sub> = 135 °C, δ = 0.5	1	A
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	20	A
T <sub>stg</sub>	Storage temperature range		-65 to +175	°C
T <sub>j</sub>	Operating junction temperature range		-40 to +175	°C

**Table 2. Thermal parameters**

Symbol	Parameter	Typ.	Max.	Unit
R <sub>th(j-l)</sub>	Junction to lead	16	24	°C/W

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = 600 V	-		1	μA
		T <sub>j</sub> = 150 °C		-	10	75	
V <sub>F</sub>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 1 A	-		1.9	V
		T <sub>j</sub> = 150 °C		-	1.08	1.4	

To evaluate the conduction losses, use the following equation:

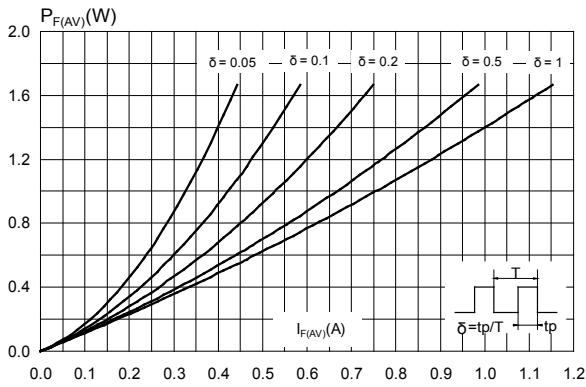
$$P = 1.1 \times I_{F(AV)} + 0.30 \times I_F^2_{(RMS)}$$

**Table 4. Dynamic electrical characteristics**

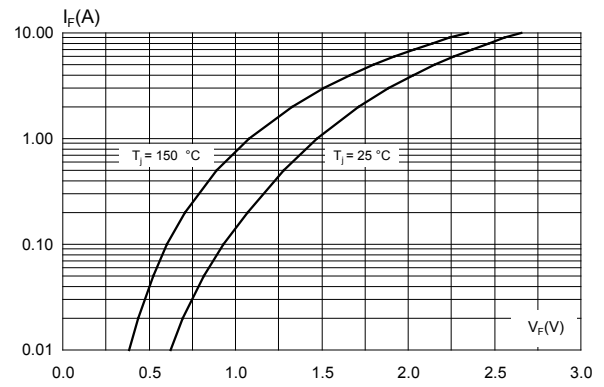
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t <sub>rr</sub>	Reverse recovery time	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 1 A, V <sub>R</sub> = 30 V, di <sub>F</sub> /dt = -50 A/μs	-	30	45	ns
I <sub>RM</sub>	Reverse recovery current	T <sub>j</sub> = 125 °C	I <sub>F</sub> = 1 A, V <sub>R</sub> = 400 V, di <sub>F</sub> /dt = -200 A/μs	-	3		A
Q <sub>RR</sub>	Reverse recovery charge			-	90		nC
t <sub>rr</sub>	Reverse recovery time			-	65		ns

## 1.1 Characteristics (curves)

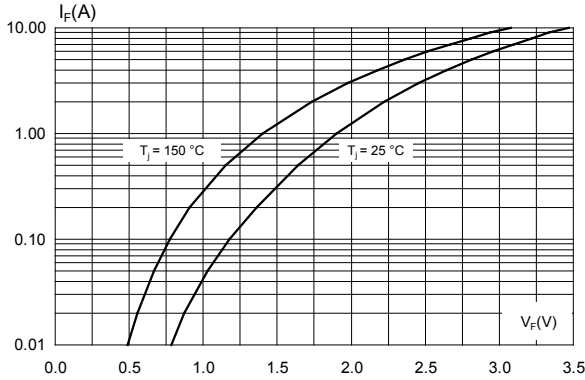
**Figure 2. Average forward power dissipation versus average forward current**



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



**Figure 4. Forward voltage drop versus forward current (maximum values)**



**Figure 5. Relative variation of thermal impedance junction to lead versus pulse duration**

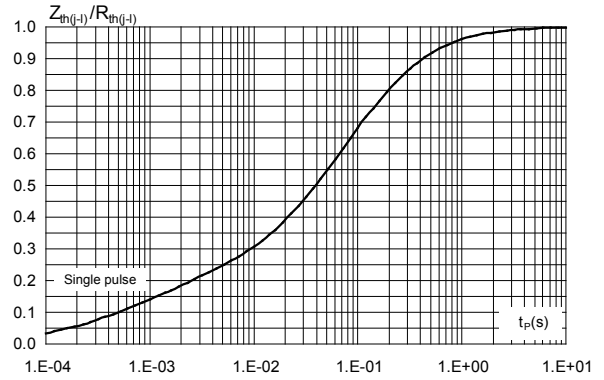


Figure 6. Peak reverse recovery current versus  $di_F/dt$  (typical values)

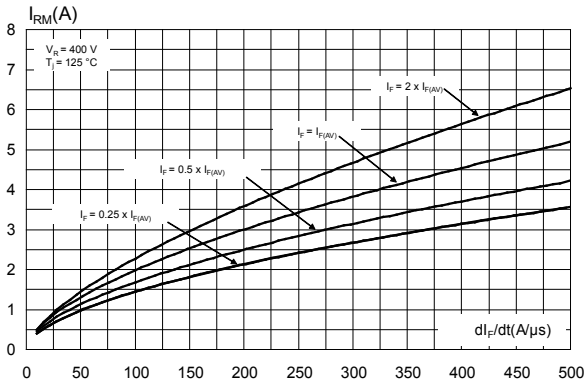


Figure 7. Reverse recovery time versus  $di_F/dt$  (typical values)

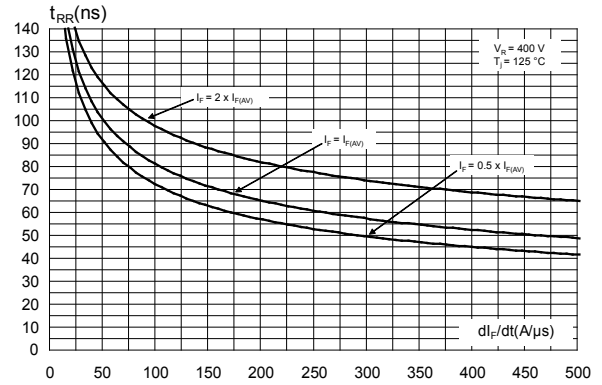


Figure 8. Reverse recovery charges versus  $di_F/dt$  (typical values)

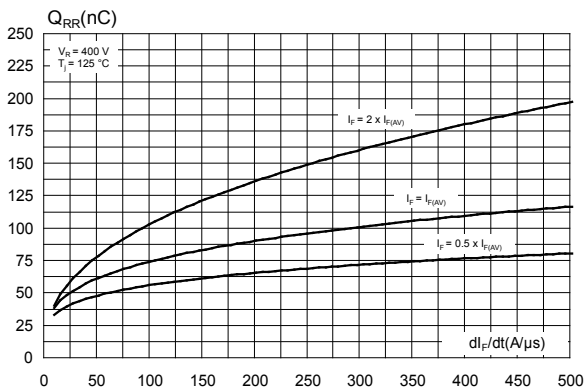


Figure 9. Softness factor versus  $di_F/dt$  (typical values)

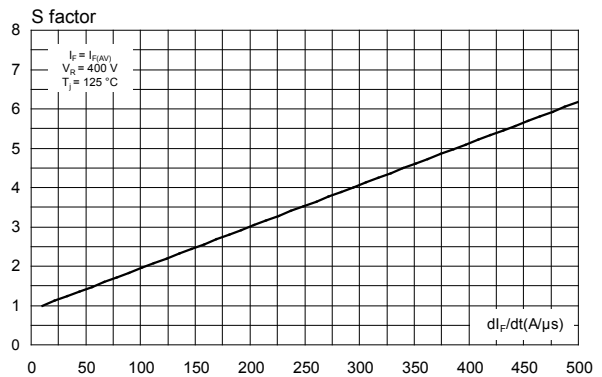


Figure 10. Relative variations of dynamic parameters versus junction temperature

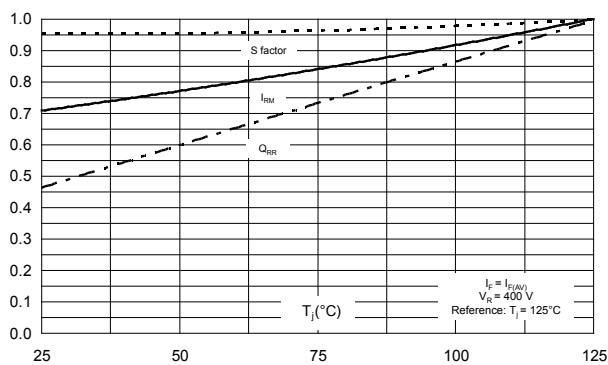
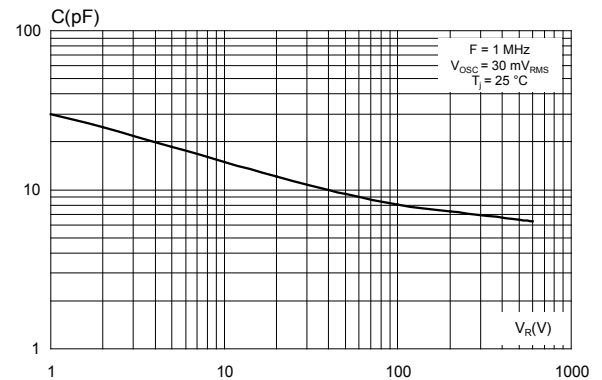
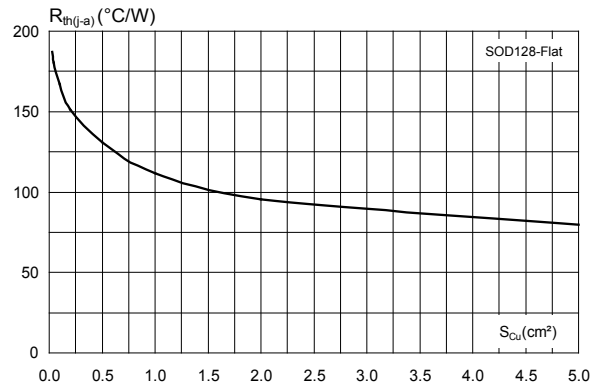


Figure 11. Junction capacitance versus reverse voltage applied (typical values)



**Figure 12. Thermal resistance junction to ambient versus copper surface under each lead (typical values, epoxy printed board FR4,  $e_{Cu} = 35 \mu m$ )**



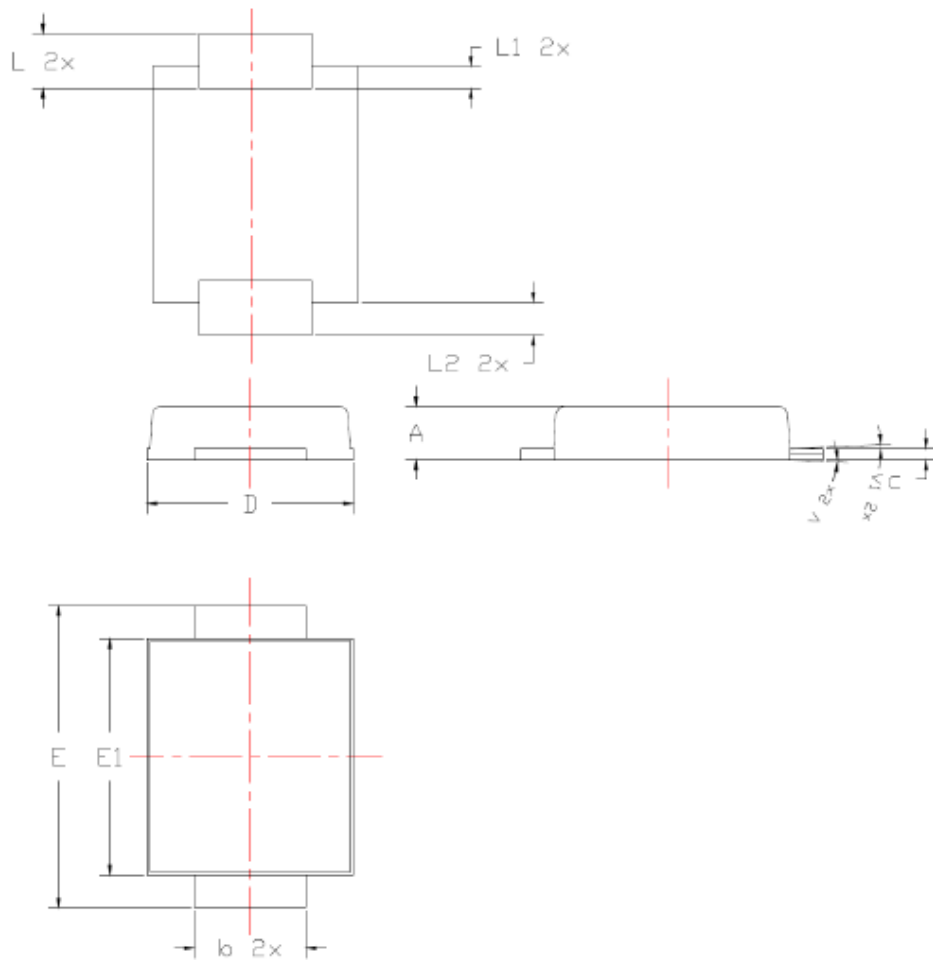
## 2 Package information

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 SOD128Flat package information

- Epoxy meets UL94, V0
- Lead-free package

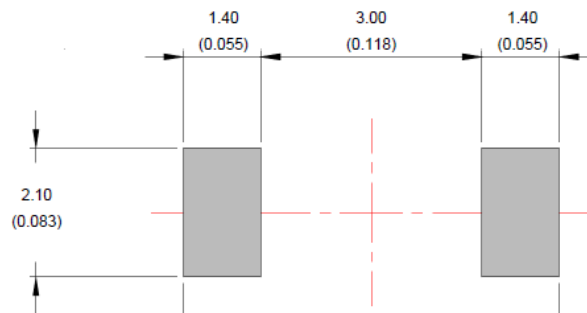
Figure 13. SOD128Flat package outline



**Table 5. SOD128Flat package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.93	1.03	0.037	0.041
b	1.69	1.81	0.067	0.071
c	0.10	0.22	0.004	0.009
D	2.30	2.50	0.091	0.098
E	4.60	4.80	0.181	0.189
E1	3.70	3.90	0.146	0.154
L	0.55	0.85	0.026	0.033
L1	0.30 typ.		0.012 typ.	
L2	0.45 typ.		0.018 typ.	

**Figure 14. SOD128Flat footprint in mm (inches)**



### 3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH1R06AFY	1R6AY	SOD128Flat	26.4 mg	3000	Tape and reel



## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
01-Feb-2018	1	Initial release.
06-Dec-2018	2	Added <a href="#">Section Applications</a> . Updated title of document.

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