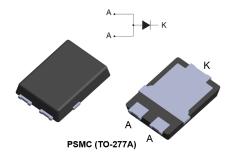
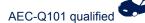


## Automotive 200 V ultrafast recovery diode



#### **Features**



- Very low conduction losses
- Negligible switching losses
- 175 °C maximum junction temperature
- V<sub>RRM</sub> guaranteed from -40 °C to 175 °C
- · Wettable flanks for automatic visual inspection
- · PPAP capable
- ECOPACK®2 compliant component

## **Application**

- DC/DC converters
- · Reverse polarity protection
- Snubber
- Boost function
- · Freewheeling diode

### **Description**

The STTH802SFY ultrafast recovery diode has been designed for automotive applications.

Packaged in PSMC (TO-277A), this device provides a high level of performance in a compact and flat package which can withstand high operating junction temperature.

Product status link		
STTH802SFY		
Product summary		
Symbol	Value	
I <sub>F(AV)</sub>	8 A	
V <sub>RRM</sub>	200 V	
T <sub>j</sub> (max.)	175 °C	
V <sub>F</sub> (typ.)	0.79 V	
t <sub>rr</sub> (typ.)	17 ns	



### 1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified with 2 anode terminals short-circuited)

Symbol	Param	Parameter			
V <sub>RRM</sub>	Repetitive peak reverse voltage (T <sub>j</sub> = -40 °C to +175 °C)		200	V	
I <sub>F(AV)</sub>	Average forward current $T_c = 145 ^{\circ}\text{C}$ , $\delta = 0.5 ^{\circ}\text{square pulse}$		8	Α	
I <sub>FSM</sub>	Surge non repetitive forward current $t_p = 10 \text{ ms sinusoidal}$		150	Α	
T <sub>stg</sub>	Storage temperature range	-65 to +175	°C		
Tj	Operating junction temperature range <sup>(1)</sup>		-40 to +175	°C	

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

Table 2. Thermal resistance parameters

Symbol	Parameter	Тур.	Unit
R <sub>th(j-c)</sub>	Junction to case	2.4	°C/W

For more information, please refer to the following application note:

AN5088: Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics (anode terminals short-circuited)

Symbol	Parameter	Test co	nditions	Min.	Тур.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Deverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-		6	μА
IR <sup>(*)</sup>	Reverse leakage current	T <sub>j</sub> = 125 °C		-	6	60	
		T <sub>j</sub> = 25 °C		-	0.94	1.08	
V <sub>F</sub> <sup>(2)</sup>	V <sub>F</sub> <sup>(2)</sup> Forward voltage drop	T <sub>j</sub> = 125 °C	I <sub>F</sub> = 8 A	-	0.79	0.91	V
		T <sub>j</sub> = 150 °C		-	0.75	0.87	

<sup>1.</sup> Pulse test:  $t_p = 5$  ms,  $\delta < 2\%$ 

To evaluate the conduction losses, use the following equation:

$$P = 0.77 \times I_{F(AV)} + 0.018 \times I_{F^{2}(RMS)}$$

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 in a power diode

Table 4. Dynamic electrical characteristics (T<sub>i</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit	
+	Poverse recovery time	$I_F = 1.0 \text{ A}, dI_F/dt = -50 \text{ A}/\mu\text{s}, V_R = 30 \text{ V}$	-		35		
۲r	t <sub>rr</sub> Reverse recovery time	$I_F = 1.0 \text{ A}, dI_F/dt = -100 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$	-	17	22	ns	

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<sup>2.</sup> Pulse test:  $t_p = 380 \ \mu s, \ \delta < 2\%$ 







Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I <sub>RM</sub>	Reverse recovery current	L = 8 A dL/dt = -200 A/us V = 160 V T = 125 °C	-	5.8	7.5	Α
Q <sub>rr</sub>	Reverse recovery charge	$I_F = 8 \text{ A}, \text{ dI}_F/\text{dt} = -200 \text{ A/}\mu\text{s}, \text{ V}_R = 160 \text{ V}, \text{ T}_j = 125 \text{ °C}$		100		nC



## 1.1 Characteristics (curves)

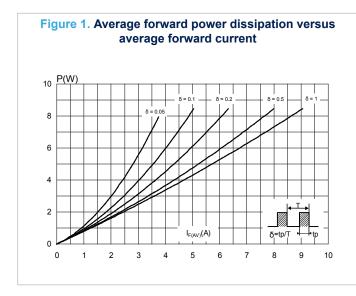


Figure 3. Forward voltage drop versus forward current (maximum values)

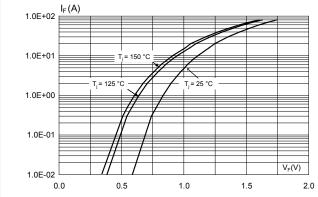
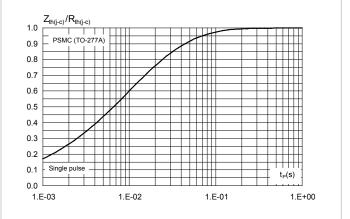


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration



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Figure 5. Peak reverse recovery current versus dl<sub>F</sub>/dt (typical values)

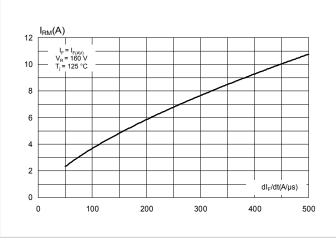


Figure 6. Reverse recovery time versus dl<sub>F</sub>/dt (typical values)

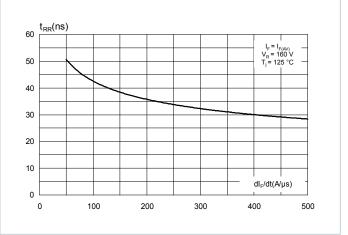


Figure 7. Reverse recovery charges versus dl<sub>F</sub>/dt (typical values)

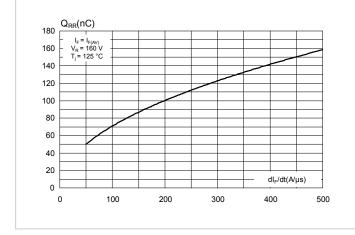


Figure 8. Reverse recovery softness factor versus dl<sub>F</sub>/dt (typical values)

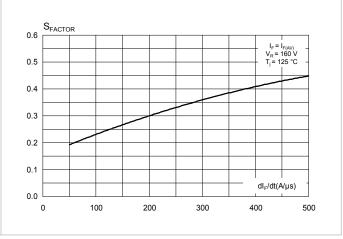


Figure 9. Relative variations of dynamic parameters versus junction temperature

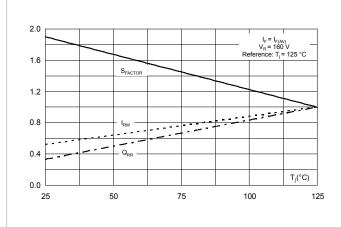
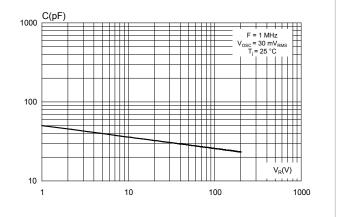


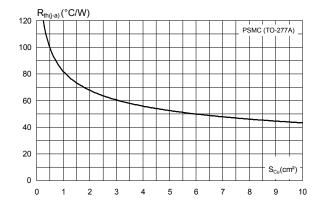
Figure 10. Junction capacitance versus reverse voltage applied (typical values)



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Figure 11. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4,  $e_{Cu}$  = 35  $\mu$ m) (PSMC (TO-277A))



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## 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 PSMC (TO277-A) package information

Figure 12. PSMC (TO-277A) package outline

Table 5. PSMC (TO-277A) package mechanical data

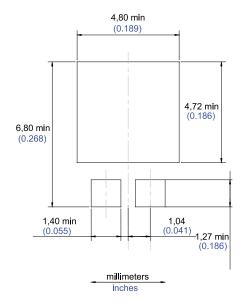
				Dimensions		
Ref.		Millimeters		Inch	es (for reference onl	y)
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	1.00	1.10	1.20	0.039	0.043	0.047
b	1.05	1.20	1.35	0.041	0.047	0.053
b2	1.90	2.05	2.20	0.075	0.081	0.087
b4		0.75			0.029	
С	0.15	0.23	0.40	0.006	0.009	0.016
D	4.45	4.60	4.75	0.175	0.181	0.187
D1	4.25	4.40	4.45	0.167	0.173	0.175
D2	3.40	3.60	3.70	0.134	0.142	0.146
Е	6.35	6.50	6.65	0.250	0.256	0.262
E1	6.05	6.10	6.15	0.238	0.240	0.242

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				Dimensions		
Ref.		Millimeters		Inch	es (for reference onl	y)
	Min.	Тур.	Max.	Min.	Тур.	Max.
E2	4.50	4.60	4.70	0.177	0.181	0.185
E3		3.94			1.55	
е		2.13			0.084	
e1		3.33			0.131	
G		1.20			0.047	
G1		0.70			0.027	
L	0.90	1.05	1.24	0.035	0.041	0.049
L4	0.02			0.0008		
L5	0.02			0.0008		

Figure 13. PSMC (TO-277A) package footprint



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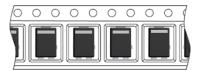
Figure 14. PSMC (TO-277A) marking



E : ECOPACK grade XXXX : Marking

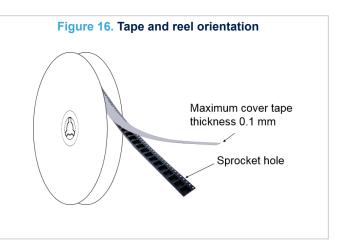
ZZ : Manufacturing location Y : Year WW : week

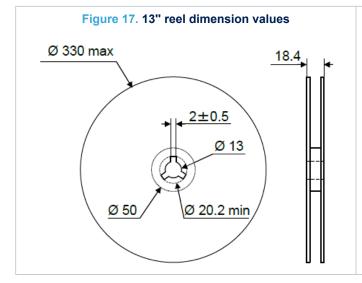
Figure 15. Package orientation in reel

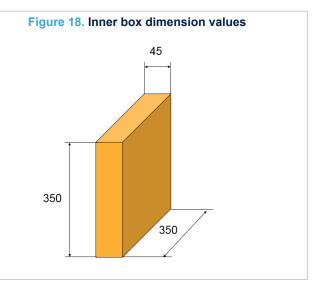


Taped according to EIA-481

Note: Pocket dimensions are not on scale Pocket shape may vary depending on package Cathode band only on unidirectional devices



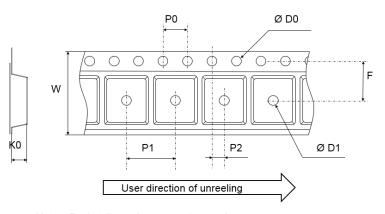




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Figure 19. Tape outline



Note: Pocket dimensions are not on scale Pocket shape may vary depending on package

Table 6. Tape dimension values

	Dimensions					
Ref.	Millimeters					
	Min.	Тур.	Max.			
D0	1.5	1.55	1.6			
D1	1.5					
F	5.45	5.5	5.55			
К0	1.3	1.4	1.5			
P0	3.9	4.0	4.1			
P1	7.9	8.0	8.1			
P2	1.95	2.0	2.05			
W	11.7	12	12.3			

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# **3** Ordering information

**Table 7. Ordering information** 

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH802SFY	TH802Y	PSMC (TO-277A)	90 mg	6000	Tape and Reel

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## **Revision history**

Table 8. Document revision history

Date	Version	Changes
07-Jul-2018	1	Initial release.

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