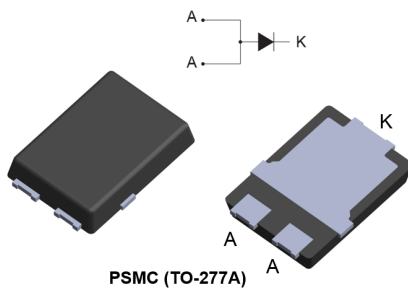



## Automotive 100 V, 5 A low $I_r$ power Schottky rectifier



### Features

- AEC-Q101 qualified 
- PPAP capable
- $V_{RRM}$  guaranteed from  $-40\text{ }^{\circ}\text{C}$  to  $175\text{ }^{\circ}\text{C}$
- Low leakage current
- Avalanche capability specified
- Very low conduction losses
- High junction temperature capability
- Low profile design - 1.1 mm package typical height
- Wettable flanks for automatic visual inspection
- ECOPACK2 compliant component

### Applications

- DC / DC converter
- Auxiliary Power supply
- Freewheeling function
- Reverse battery protection

### Description

The 5 A, 100 V power Schottky rectifier has been designed for automotive applications.

Packaged in PSMC (TO-277A), the **STPS5S100SFY** provides a high level of performance in a compact and flat package which can withstand high operating junction temperature.

Product status link	
STPS5S100SFY	
Product summary	
Symbol	Value
$I_{F(AV)}$	5 A
$V_{RRM}$	100 V
$T_j$ (max.)	175 $^{\circ}\text{C}$
$V_F$ (typ.)	0.590 V

# 1 Characteristics

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

Symbol	Parameter	Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage (T <sub>j</sub> = -40 °C to +175 °C)	100	V
I <sub>F(AV)</sub>	Average forward current, δ = 0.5	T <sub>c</sub> = 160 °C	A
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	A
P <sub>ARM</sub>	Repetitive peak avalanche power	t <sub>p</sub> = 10 μs, T <sub>j</sub> = 125 °C	W
T <sub>stg</sub>	Storage temperature range	-65 to +175	°C
T <sub>j</sub>	Operating junction temperature range <sup>(1)</sup>	-40 to +175	°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 parameters**

Symbol	Parameter	Typ.	Unit
R <sub>th(j-c)</sub>	Junction to case	1.46	°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 conditions	Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	-		2.5	μA
		T <sub>j</sub> = 125 °C	-	0.85	2.0	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	-		0.720	V
		T <sub>j</sub> = 125 °C	-	0.525	0.595	
		T <sub>j</sub> = 25 °C	-		0.820	
		T <sub>j</sub> = 125 °C	-	0.590	0.670	

1. Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

2. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

To evaluate the conduction losses, use the following equation:

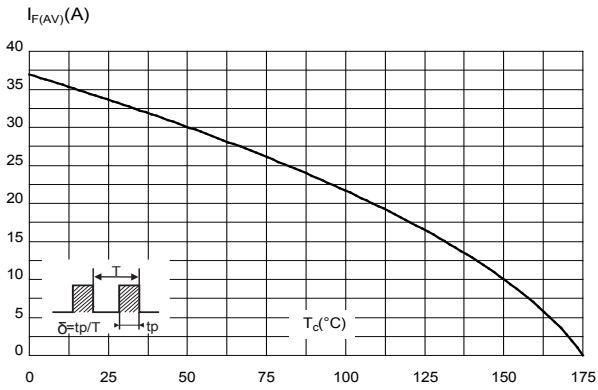
$$P = 0.520 \times I_{F(AV)} + 0.030 \times I_{F(RMS)}^2$$

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

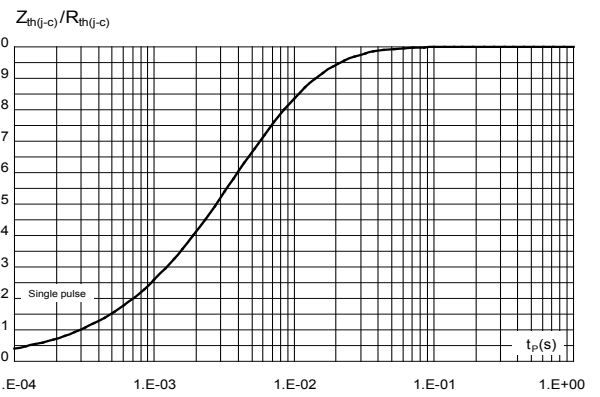
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses in a power diode

## 1.1 Characteristics (curves)

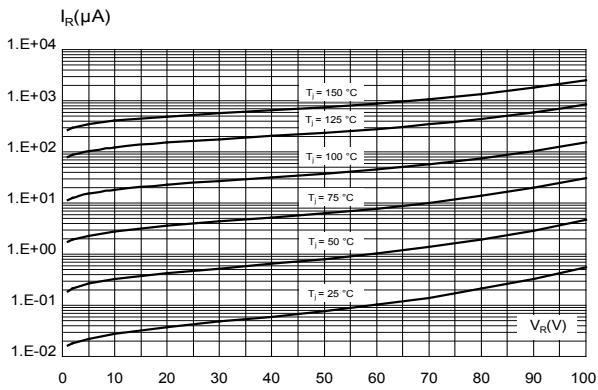
**Figure 1. Average forward current versus case temperature ( $\delta = 0.5$ )**



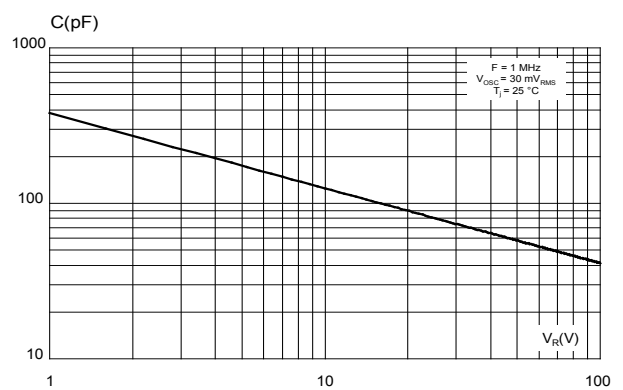
**Figure 2. Relative variation of thermal impedance junction to case versus pulse duration**



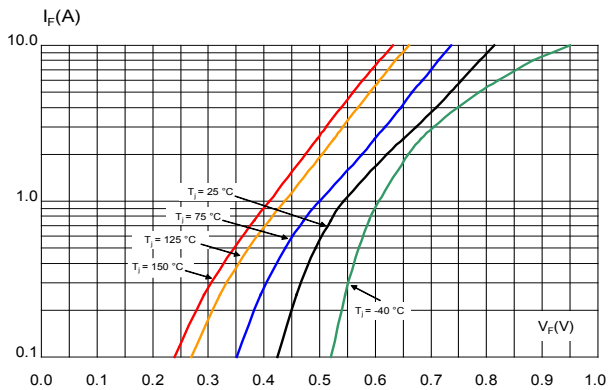
**Figure 3. Reverse leakage current versus reverse voltage applied (typical values)**



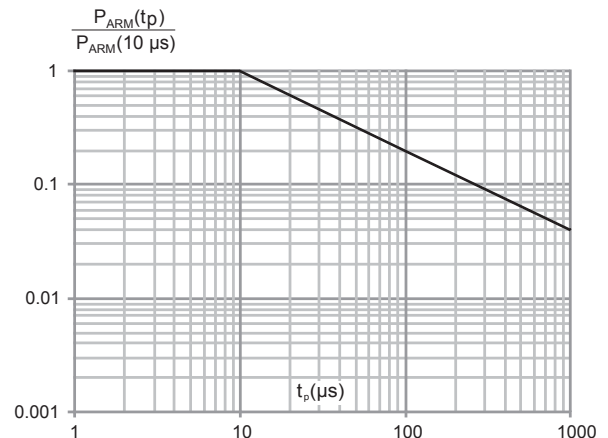
**Figure 4. Junction capacitance versus reverse voltage applied (typical values)**



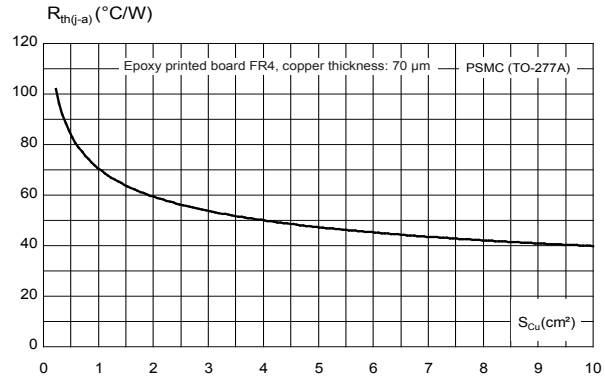
**Figure 5. Forward voltage drop versus forward current (typical values)**



**Figure 6. Normalized avalanche power derating versus pulse duration ( $T_j = 125$  °C)**



**Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4,  $e_{Cu} = 70 \mu\text{m}$ ) (PSMC (TO-277A))**



## 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 PSMC (TO-277A) package information

- Epoxy meets UL94,V0
- Cooling method : by conduction (C)

**Figure 8. PSMC (TO-277A) package outline**

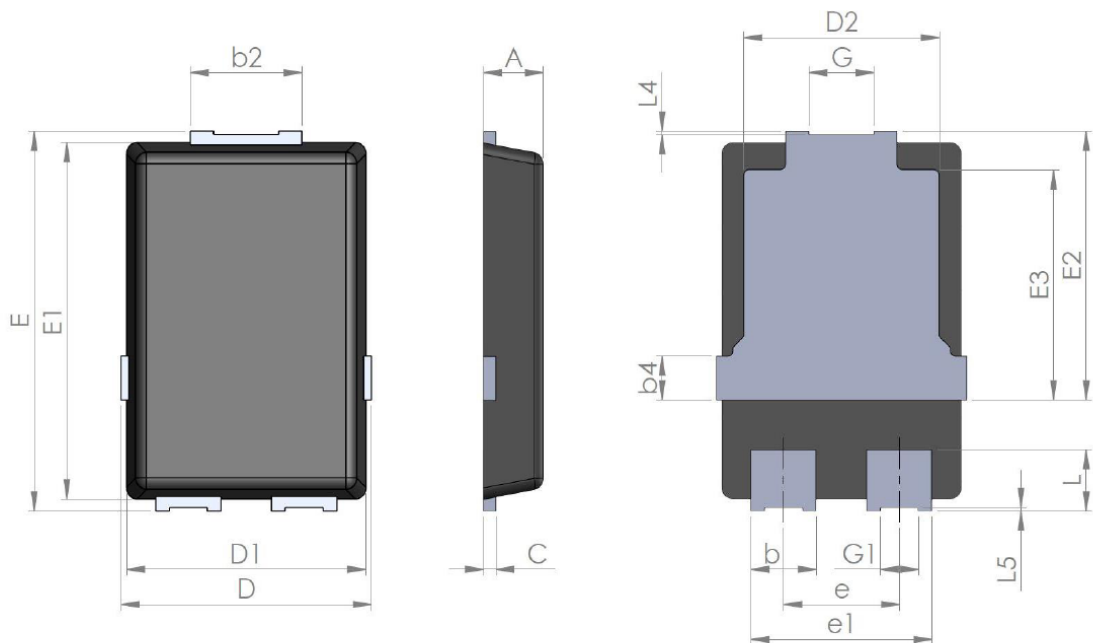
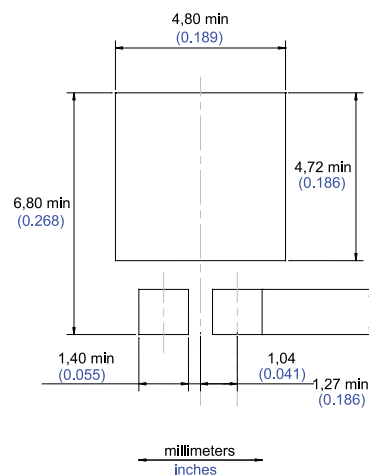


Table 4. PSMC (TO-277A) package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	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	
C	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
E	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
E2	4.50	4.60	4.70	0.177	0.181	0.185
E3		3.94			1.55	
e		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 9. PSMC (TO-277A) package footprint in mm (in inches)



Note: For package and tape orientation, reel and inner box dimensions and tape outline please check [TN1173](#)

### 3 Ordering information

**Table 5. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS5S100SFY	Y5S100	PSMC (TO-277A)	90 mg	6000	Tape and Reel

## Revision history

**Table 6. Document revision history**

Date	Version	Changes
01-Dec-2020	1	Initial release.

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