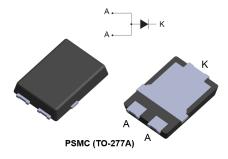


## 60 V power Schottky rectifier



#### **Features**

- Low profile design package height of 1.1 mm typ.
- · Wettable flanks for automatic visual inspection
- · Low forward voltage drop
- Avalanche capability
- ECOPACK®2 compliant

## **Applications**

- · Set-top box
- Battery charger
- DC/DC converter
- · Notebook adapter
- · Switching diode

## **Description**

This 60 V Schottky barrier rectifier has been optimized for use in high frequency miniature DC/DC converters, reverse battery protection, battery chargers and adaptors.

Packaged in PSMC (TO-277A), the STPS5L60SF provides a high level of performance in a compact and flat package which can withstand high operating junction temperature.

Product status link				
STPS5L60SF				
Product summary				
Symbol	Symbol Value			
I <sub>F(AV)</sub>	5 A			
V <sub>RRM</sub>	60 V			
T <sub>j</sub> (max.)	150 °C			
V <sub>F</sub> (typ.)	0.40 V			



## 1 Characteristics

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

Symbol	Parameter	Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage	60	V	
I <sub>F(AV)</sub>	Average forward current , $\delta$ = 0.5 square pulse	5	Α	
I <sub>FSM</sub>	Surge non repetitive forward current	220	Α	
P <sub>ARM</sub>	Repetitive peak avalanche power	280	W	
T <sub>stg</sub>	Storage temperature range	-65 to +175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(1)</sup> +1			°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	Typ. value	Unit
$R_{th(j-c)}$	Junction to case	1.9	°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.	Тур.	Max.	Unit
I_ (1)	I <sub>R</sub> <sup>(1)</sup> Reverse leakage current	T <sub>j</sub> = 25 °C	\/ -\/	-		470	μA
'R'		T <sub>j</sub> = 125 °C	$V_R = V_{RRM}$	-	50	150	mA
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 2.5 A	-		0.44	V
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 125 °C		-	0.30	0.35	
VF. /		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 5 A	-		0.51	
		T <sub>j</sub> = 125 °C		-	0.40	0.46	

- 1. Pulse test:  $t_p$  = 5 ms,  $\delta$  < 2%
- 2. Pulse test:  $t_p$  = 380  $\mu$ s,  $\delta$  < 2%

To evaluate the maximum conduction losses, use the following equation:

$$P = 0.24 \times I_{F(AV)} + 0.044 \times I_{F}^{2}(RMS)$$

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

DS12691 - Rev 1 page 2/9



#### 1.1 **Characteristics (curves)**

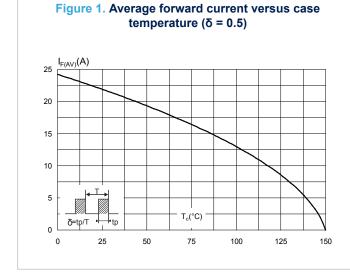
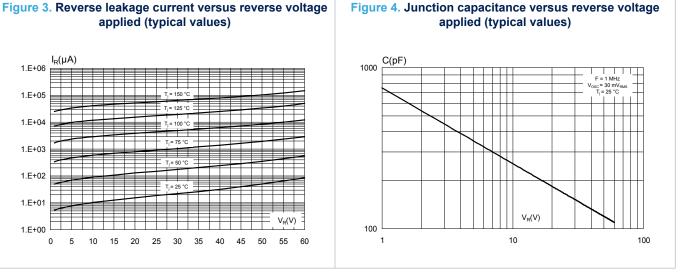


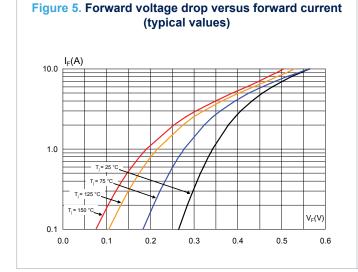
Figure 2. Relative variation of thermal impedance junction to case versus pulse duration 1.0 0.9 0.8 0.7 0.6 0.5 0.3 0.2 0.1 tp(s) 0.0 1.E-04 1.E-03 1.E-02 1.E-01 1.E+00

applied (typical values)  $I_R(\mu A)$ 1.E+06 1.E+05 1.E+04 1.E+03 1.E+01 1.E+00



DS12691 - Rev 1 page 3/9





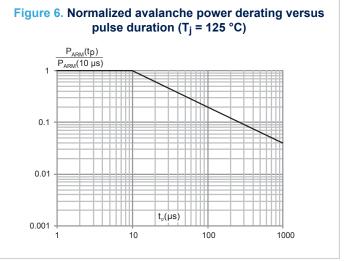
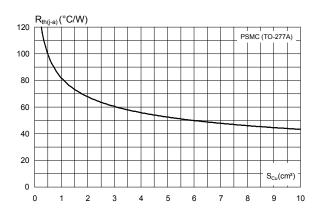


Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4,  $e_{Cu}$  = 35  $\mu$ m) (PSMC (TO-277A))



DS12691 - Rev 1 page 4/9



## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: www.st.com. ECOPACK<sup>®</sup> is an ST trademark.

## 2.1 PSMC (TO-277A) package information

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

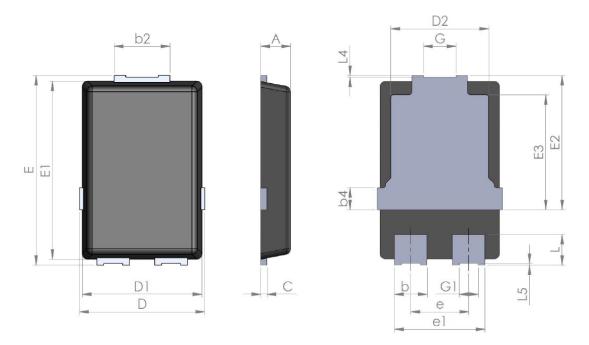


Figure 8. PSMC (TO-277A) package outline

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

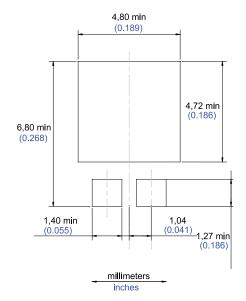
	Dimensions						
Ref.	Ref.		Millimeters		Inches (for reference only)		
	Min.	Тур.	Max.	Min.	Тур.	Max.	
А	1.00	1.10	1.20	0.039	0.043	0.047	
b	1.05	1.20	1.35	0.041	0.047	0.053	
b2	1.90	2.05	2.20	0.075	0.081	0.087	
b4		0.75			0.029		
С	0.15	0.23	0.40	0.006	0.009	0.016	
D	4.45	4.60	4.75	0.175	0.181	0.187	
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	

DS12691 - Rev 1 page 5/9



	Dimensions						
Ref.		Millimeters			Inches (for reference only)		
	Min.	Тур.	Max.	Min.	Тур.	Max.	
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		
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 9. PSMC (TO-277A) package footprint in mm (in inches)



DS12691 - Rev 1 page 6/9





# 3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS5L60SF	PS5L60	PSMC (TO-277A)	90 mg	6000	Tape and Reel

DS12691 - Rev 1 page 7/9



## **Revision history**

**Table 6. Document revision history** 

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

DS12691 - Rev 1 page 8/9



#### **IMPORTANT NOTICE - PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics - All rights reserved

DS12691 - Rev 1 page 9/9