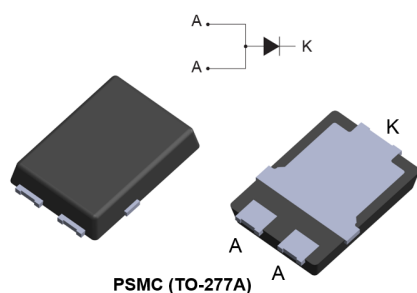



## Automotive 60 V low $V_F$ power Schottky rectifier



### Features

- AEC-Q101 qualified
-  Low forward voltage drop
- Negligible switching losses
- Avalanche capability specified
- 150 °C maximum junction temperature
- $V_{RRM}$  guaranteed from -40 °C to 150 °C
- Wettable flanks for automatic visual inspection
- PPAP capable
- ECOPACK®2 compliant component

### Application

- DC/DC converters
- Reverse polarity protection
- Freewheeling diodes
- Switching diodes

### Description

The **STPS5L60SFY** power Schottky rectifier has been designed for automotive applications.

Packaged in PSMC (TO-277A), this device provides a very low  $V_F$  in a compact package which can withstand high operating junction temperature.

Product status link	
<a href="#">STPS5L60SFY</a>	
Product summary	
Symbol	Value
$I_{F(AV)}$	5 A
$V_{RRM}$	60 V
$T_j$ (max.)	150 °C
$V_F$ (typ.)	0.40 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
$V_{RRM}$	Repetitive peak reverse voltage ( $T_j = -40\text{ °C}$ to $+150\text{ °C}$ )	60	V
$I_{F(AV)}$	Average forward current $T_c = 135\text{ °C}$ , $\delta = 0.5$ square pulse	5	A
$I_{FSM}$	Surge non repetitive forward current $t_p = 10\text{ ms}$ sinusoidal	220	A
$P_{ARM}$	Repetitive peak avalanche power $t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$	280	W
$T_{stg}$	Storage temperature range	-65 to +175	°C
$T_j$	Operating junction temperature range <sup>(1)</sup>	-40 to +150	°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
$R_{th(j-c)}$	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.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	470	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	50	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 2.5\text{ A}$	-	0.44	V
		$T_j = 125\text{ °C}$		-	0.30	
		$T_j = 25\text{ °C}$	$I_F = 5\text{ A}$	-	0.51	
		$T_j = 125\text{ °C}$		-	0.40	

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

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

To evaluate the conduction losses, use the following equation:

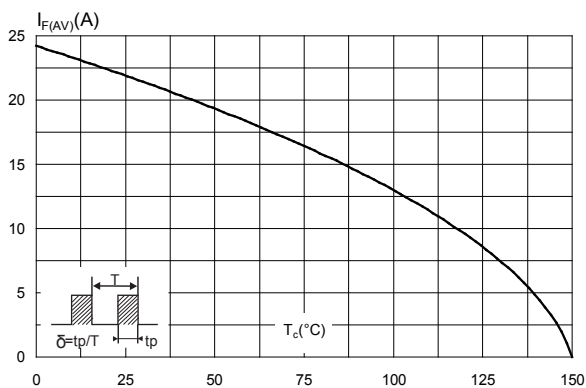
$$P = 0.24 \times I_{F(AV)} + 0.044 \times I_F^2(RMS)$$

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

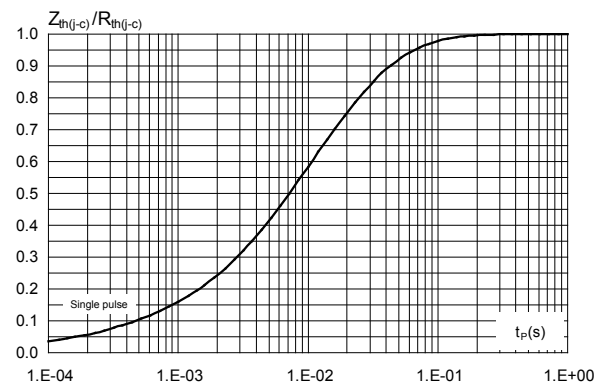
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses in a power diode

## 1.1 Characteristics (curves)

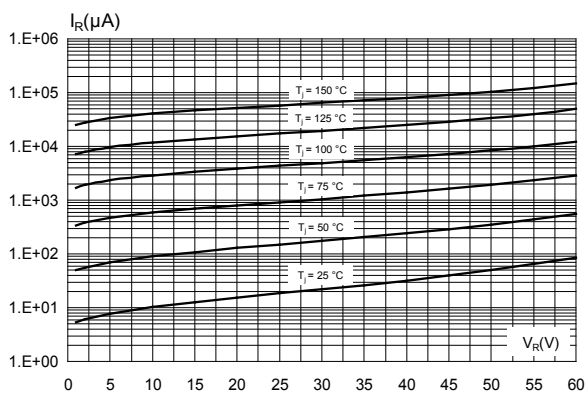
**Figure 1. Average forward current versus case temperature ( $\delta = 0.5$ )**



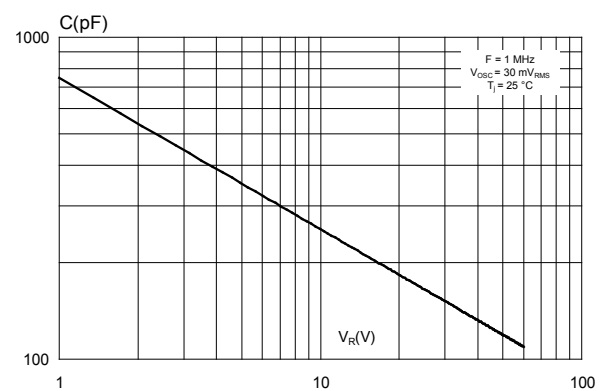
**Figure 2. Relative variation of thermal impedance junction to case versus pulse duration**



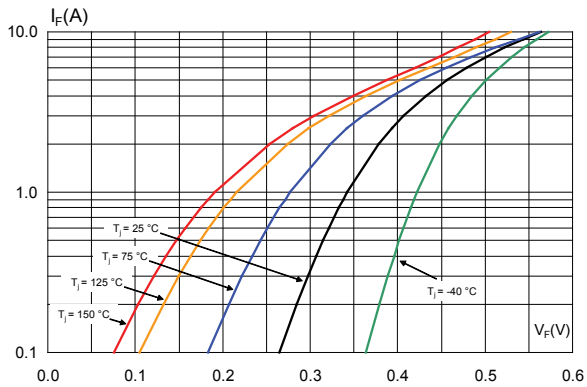
**Figure 3. Reverse leakage current versus reverse voltage applied (typical values)**



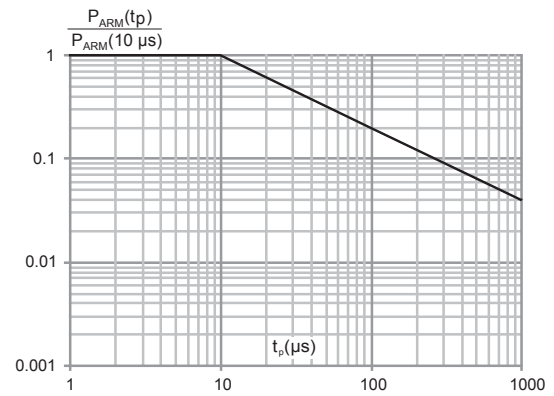
**Figure 4. Junction capacitance versus reverse voltage applied (typical values)**



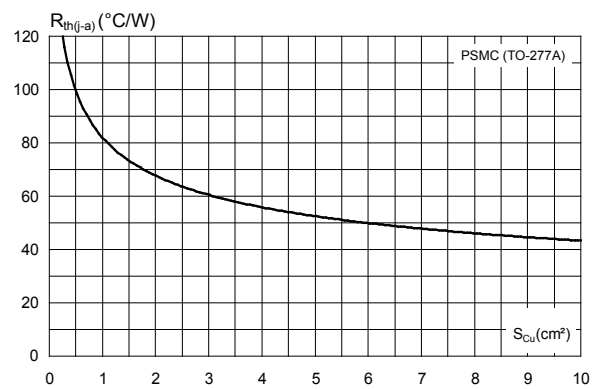
**Figure 5. Forward voltage drop versus forward current (typical values)**



**Figure 6. Normalized avalanche power derating versus pulse duration ( $T_J = 125\text{ °C}$ )**



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



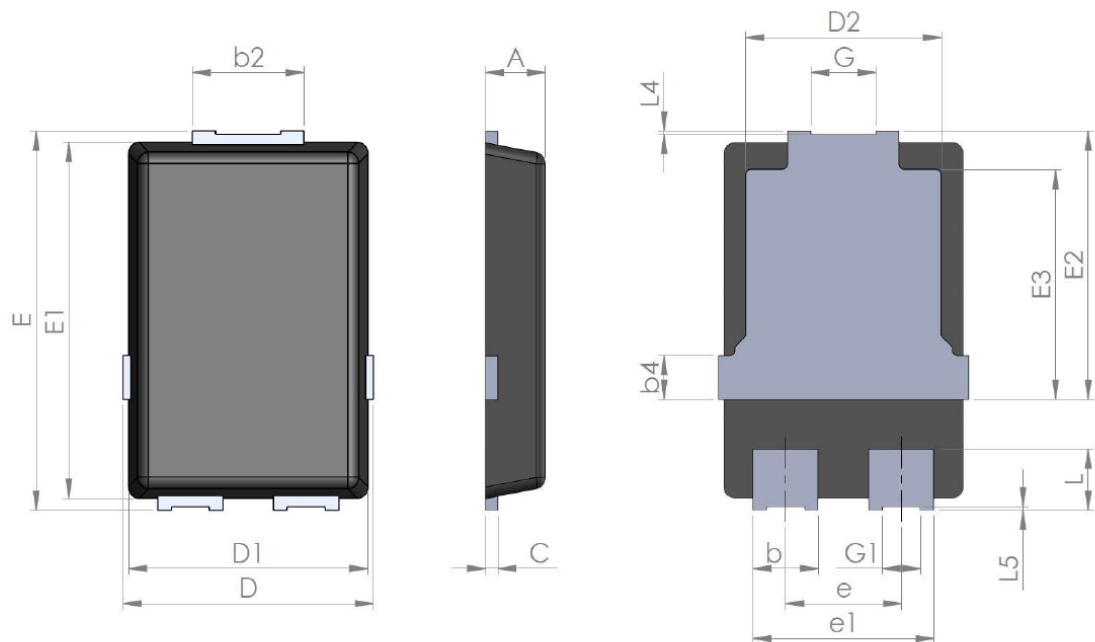
## 2 Package information

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**

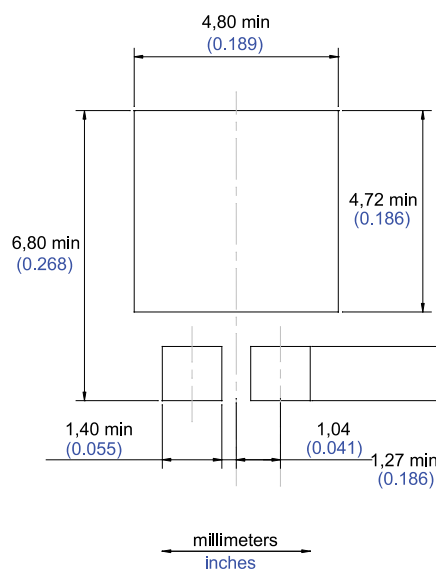


**Table 4. PSMC (TO-277A) package mechanical data**

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

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	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	
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		

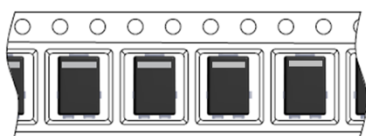
**Figure 9. PSMC (TO-277A) package footprint in mm (in inches)**



**Figure 10. PSMC (TO-277A) marking**

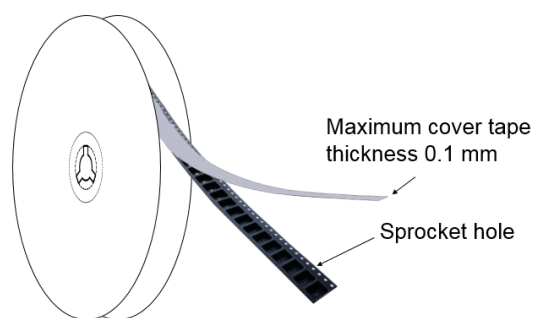


**Figure 11. Package orientation in reel**

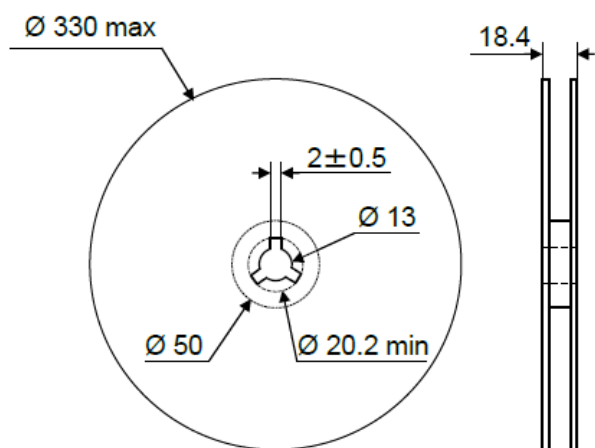


Taped according to EIA-481  
Note: Pocket dimensions are not on scale  
Pocket shape may vary depending on package  
Cathode band only on unidirectional devices

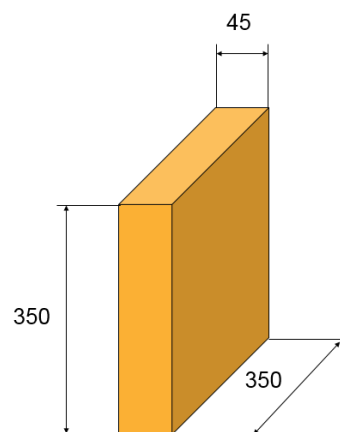
**Figure 12. Tape and reel orientation**



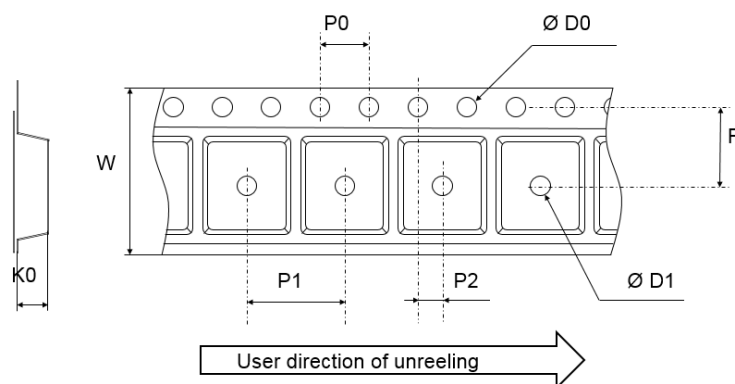
**Figure 13. 13" reel dimension values**



**Figure 14. Inner box dimension values**



**Figure 15. Tape outline**



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

**Table 5. Tape dimension values**

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.5	1.55	1.6
D1	1.5		
F	5.45	5.5	5.55
K0	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



### 3 Ordering information

**Table 6. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS5L60SFY	PS5L60Y	PSMC (TO-277A)	90 mg	6000	Tape and Reel

## Revision history

**Table 7. Document revision history**

Date	Version	Changes
05-Jul-2018	1	Initial release.
14-Aug-2018	2	Minor text change to improve readability in <a href="#">Section 1 Characteristics</a> .

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