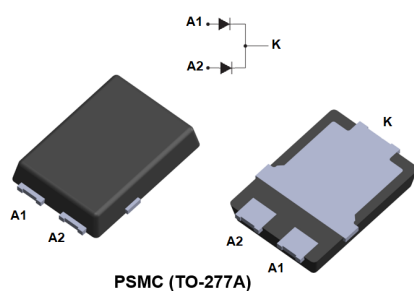



## Automotive 40 V, dual 3 A power Schottky rectifier



### Features

- AEC-Q101 qualified 
- PPAP capable
- 150 °C maximum operation junction temperature
- $V_{RRM}$  guaranteed from -40 °C to 150 °C
- High surge current capability
- ECOPACK2 compliant component

### Application

- Reverse polarity protection in E.C.U
- DC/DC converters
- Freewheeling diodes

### Description

The STPS640CSFY has been developed for applications requiring an optimized  $V_F$  and leakage current characteristics.

These characteristics make it ideal for use in secondary rectification functions, such as DC/DC converters or freewheeling functions.

Product status link	
STPS640CSFY	
Product summary	
Symbol	Value
$I_{F(AV)}$	2 X 3 A
$V_{RRM}$	40 V
$T_j$ (max.)	150 °C
$V_F$ (typ.)	0.37 V

# 1 Characteristics

**Table 1. Absolute ratings (limiting values per diode 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 +150 °C)		40	V
I <sub>F(AV)</sub>	Average forward current, δ = 0.5	Per diode	T <sub>c</sub> = 140 °C	A
		Per device	T <sub>c</sub> = 140 °C	
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 +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 <sub>th(j-c)</sub>	Junction to case total	1.5	°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 (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-		75	μA
		T <sub>j</sub> = 125 °C		-	20	30	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 3 A	-	0.44	0.49	V
		T <sub>j</sub> = 125 °C		-	0.37	0.43	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 4 A	-	0.47	0.52	
		T <sub>j</sub> = 125 °C		-	0.42	0.48	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 6 A	-	0.52	0.58	
		T <sub>j</sub> = 125 °C		-	0.50	0.57	

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:

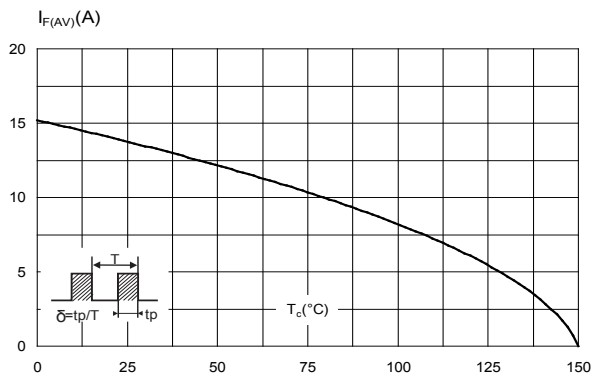
$$P = 0.23 \times I_{F(AV)} + 0.067 \times I_{F(RMS)}^2$$

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

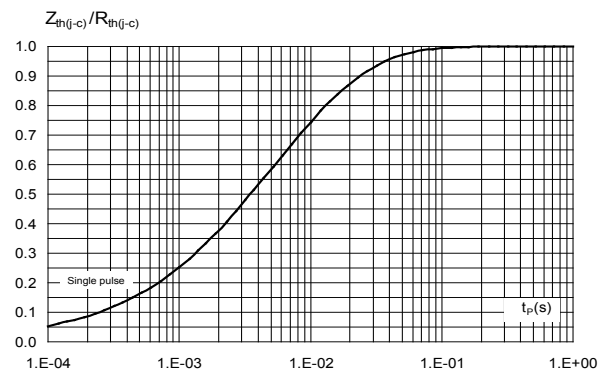
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses in a power diode

## 1.1 Characteristics (curves)

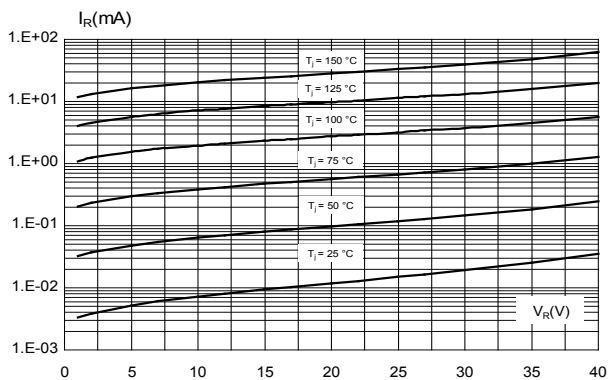
**Figure 1. Average forward current versus case temperature ( $\delta = 0.5$ , per diode)**



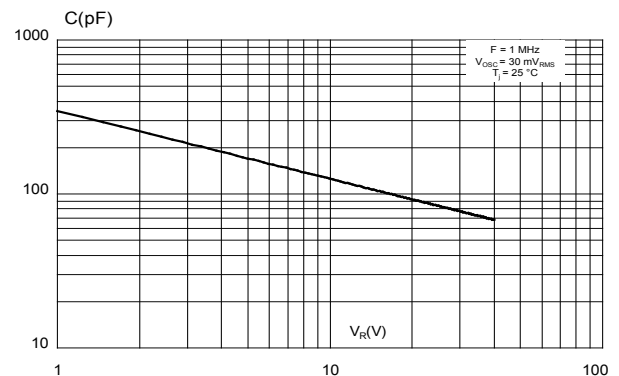
**Figure 2. Relative variation of thermal impedance junction to case versus pulse duration**



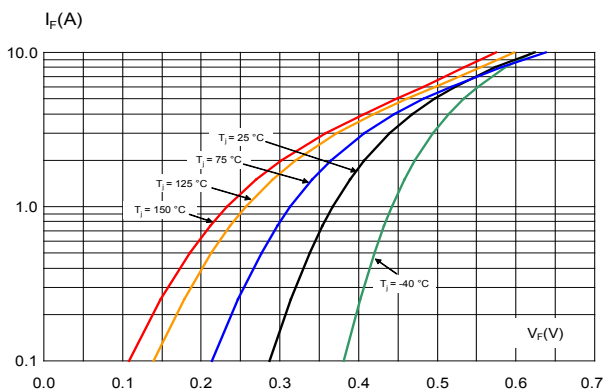
**Figure 3. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



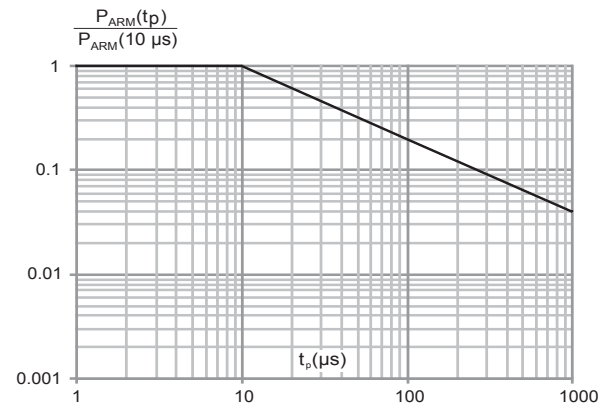
**Figure 4. Junction capacitance versus reverse voltage applied (typical values, per diode)**



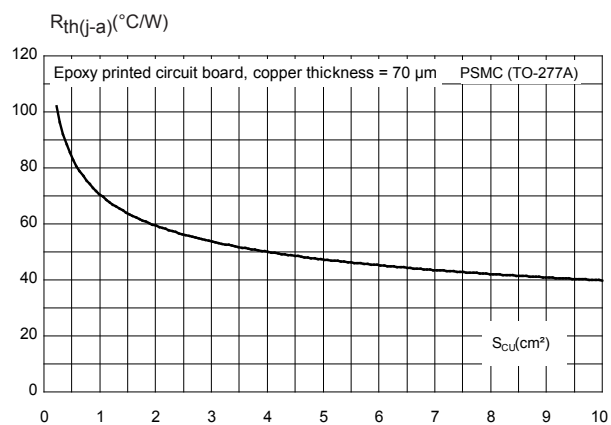
**Figure 5. Forward voltage drop versus forward current (typical values, per diode)**



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



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



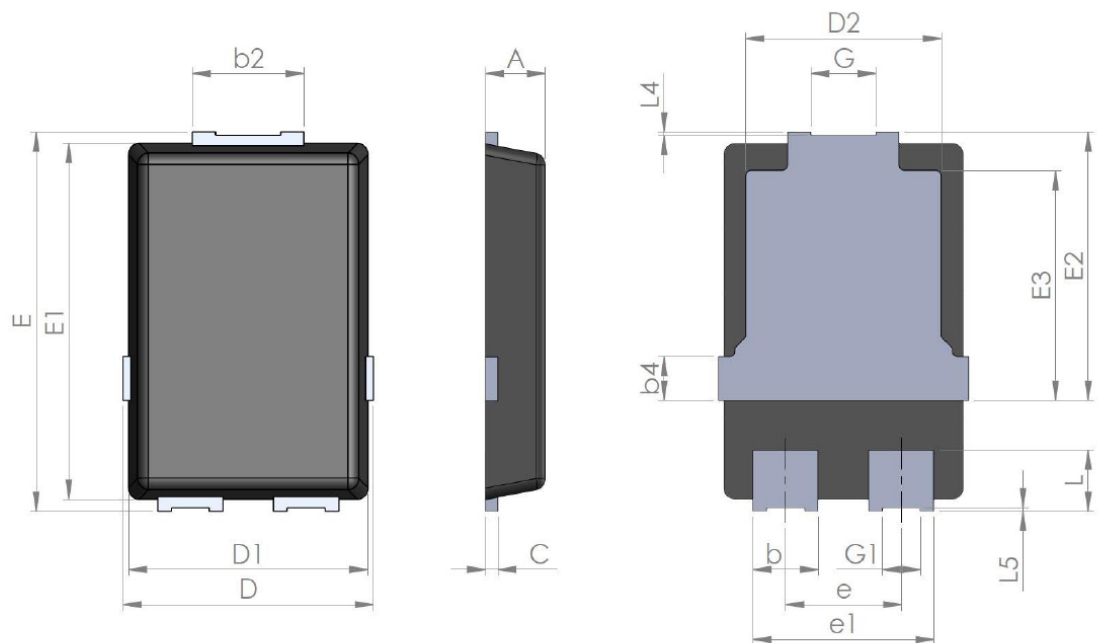
## 2 Package information

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

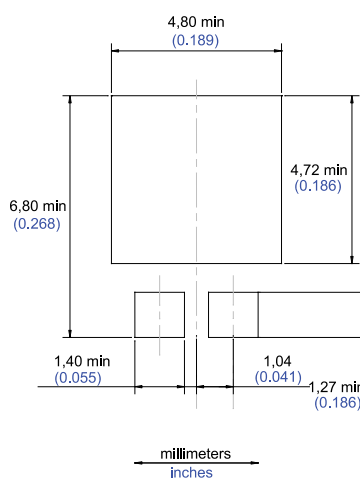
- Epoxy meets UL94,V0
- Cooling method : by conduction (C)

**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
STPS640CSFY	PS640CY	PSMC (TO-277A)	90 mg	6000	Tape and Reel

## Revision history

**Table 6. Document revision history**

Date	Version	Changes
26-Oct-2020	1	Initial release.



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