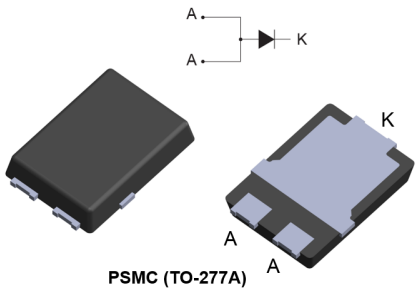
STPS1045SF

Datasheet

45 V power Schottky rectifier



PSMC (TO-277A)

Features

- Low profile design – package height of 1.1 mm typ.
- Wettable flanks for automatic visual inspection
- High junction temperature capability
- Low Leakage current
- Avalanche capability
- ECOPACK®2 compliant

Applications

- Set-top box
- Battery charger
- DC / DC converter

Description

This 45 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 STPS1045SF provides a high level of performance in a compact and flat package which can withstand very high operating junction temperature.

Product status link	
STPS1045SF	
Product summary	
Symbol	**Value**
$I_{F(AV)}$	10 A
V_{RRM}	45 V
T_j (max.)	175 °C
V_F (typ.)	0.51 V

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		45	V
$I_{F(AV)}$	Average forward current, δ = 0.5 square wave	T_c = 140 °C	10	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	210	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	172	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature(1)		+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. value	Unit
$R_{th(j-c)}$	Junction to case	2.5	°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 (anode terminals short-circuited)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		50	µA
		T_j = 125 °C		-	7	23	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-		0.54	V
		T_j = 125 °C		-	0.41	0.46	
		T_j = 25 °C	I_F = 10 A	-		0.62	
		T_j = 125 °C		-	0.51	0.57	

1. *Pulse test: t_p = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.35 \times I_{F(AV)} + 0.022 \times I_F{}^2{}_{(RMS)}$

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 (δ = 0.5)

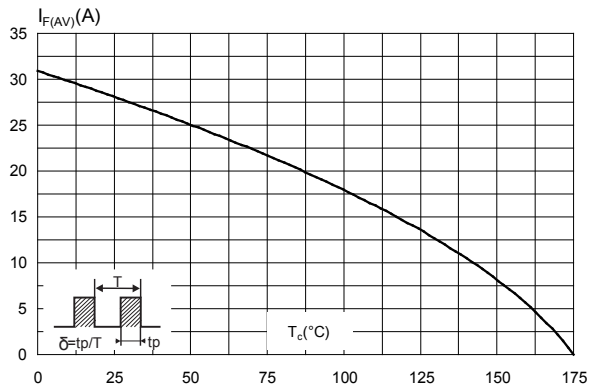


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration

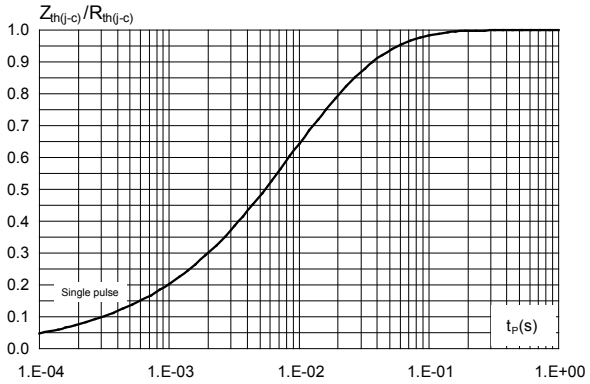


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

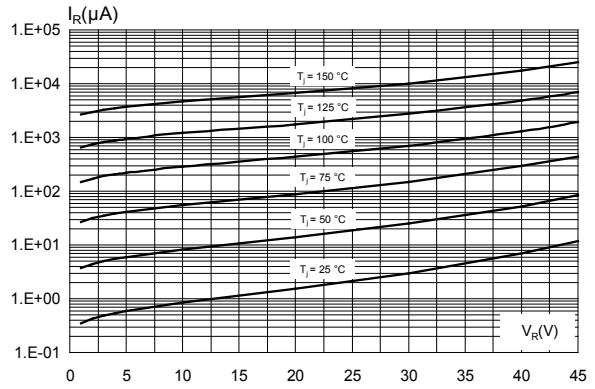


Figure 4. Junction capacitance versus reverse voltage applied (typical values)

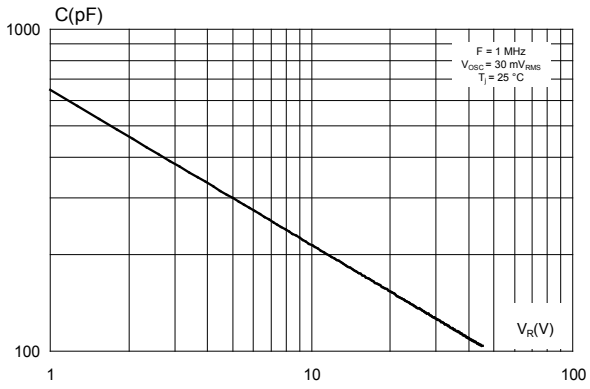


Figure 5. Forward voltage drop versus forward current (typical values)

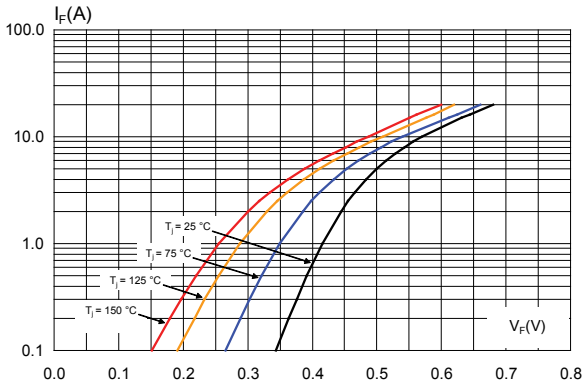


Figure 6. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

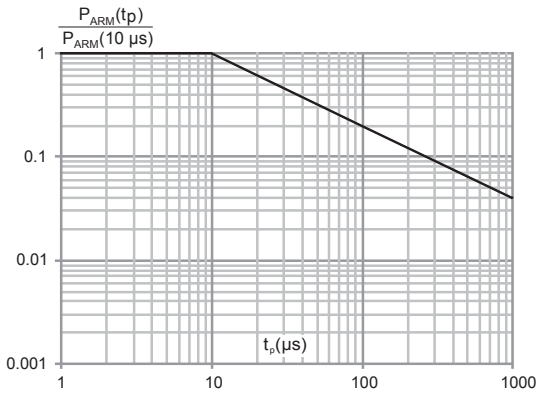
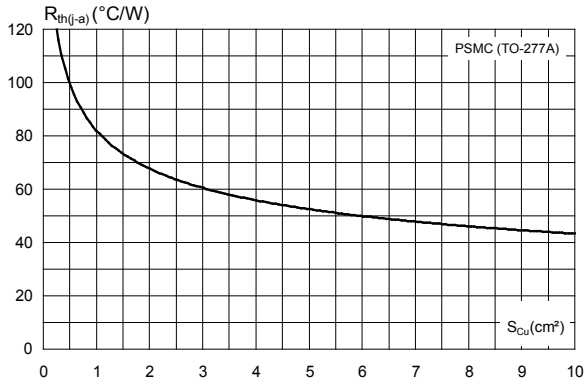


Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu} = 35 µm) (PSMC (TO-277A))



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. 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

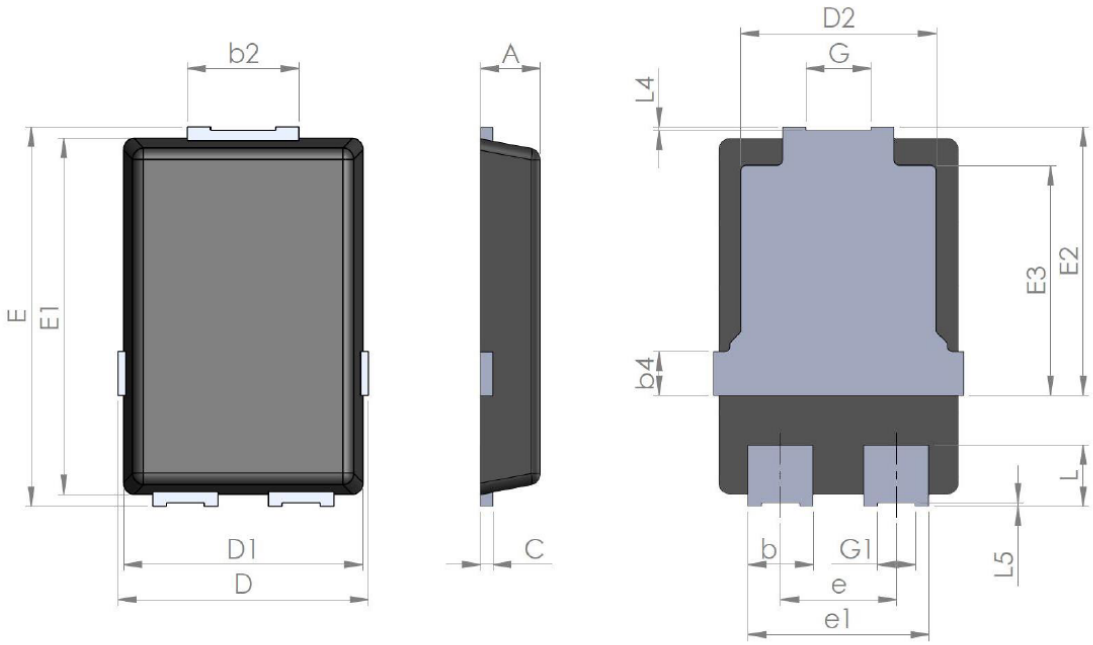
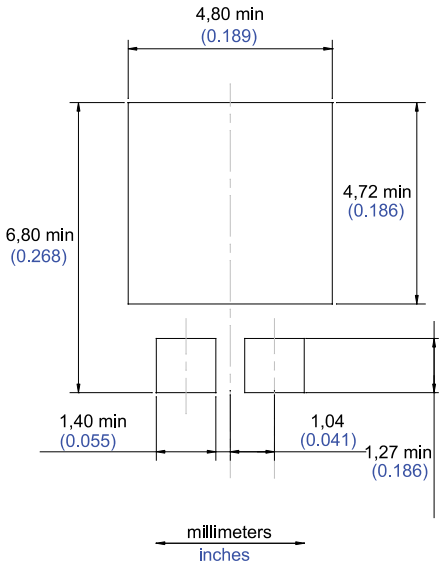


Table 4. PSMC (TO-277A) package mechanical data

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)



3 Ordering information

Table 5. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS1045SF	PS1045	PSMC (TO-277A)	90 mg	6000	Tape and Reel

Revision history

Table 6. **Document revision history**

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