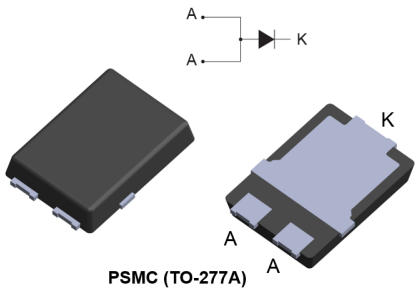
STPS10M60SFY

Datasheet

Automotive 60 V low V_F power Schottky rectifier



PSMC (TO-277A)

Features

- AEC-Q101 qualified
- Low forward voltage drop
- Negligible switching losses
- Avalanche capability specified
- 175 °C maximum junction temperature
- V_{RRM} guaranteed from -40 °C to 175 °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 STPS10M60SFY 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	
STPS10M60SFY	
Product summary	
Symbol	**Value**
$I_{F(AV)}$	10 A
V_{RRM}	60 V
T_j (max.)	175 °C
V_F (typ.)	0.53 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 °C to +175 °C)		60	V
$I_{F(AV)}$	Average forward current, δ = 0.5	T_c = 145 °C	10	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	230	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	258	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature range(1)		-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
$R_{th(j-c)}$	Junction to case	2.0	°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		-	8	25	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-		0.56	V
		T_j = 125 °C		-	0.43	0.49	
		T_j = 25 °C	I_F = 10 A	-		0.65	
		T_j = 125 °C		-	0.53	0.60	

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:

$P = 0.38 \times I_{F(AV)} + 0.022 \times I_F^2{}_{(RMS)}$

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)

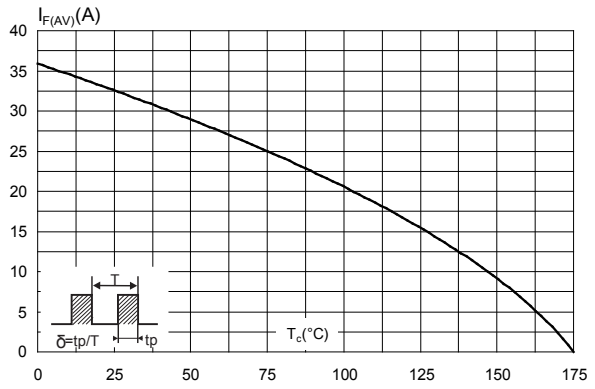


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration

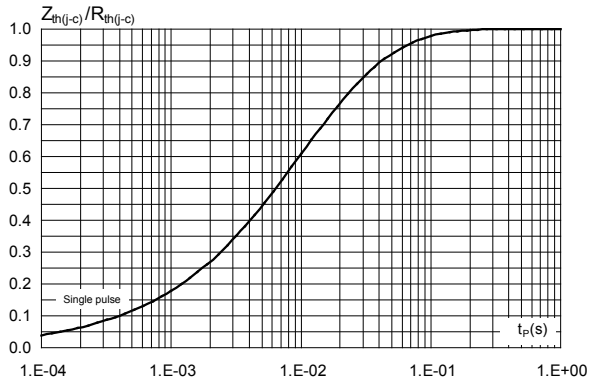


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

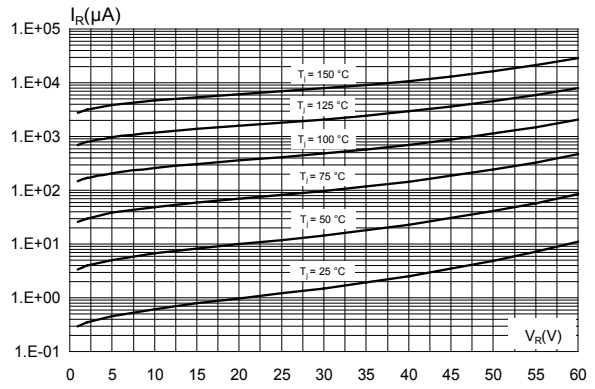


Figure 4. Junction capacitance versus reverse voltage applied (typical values)

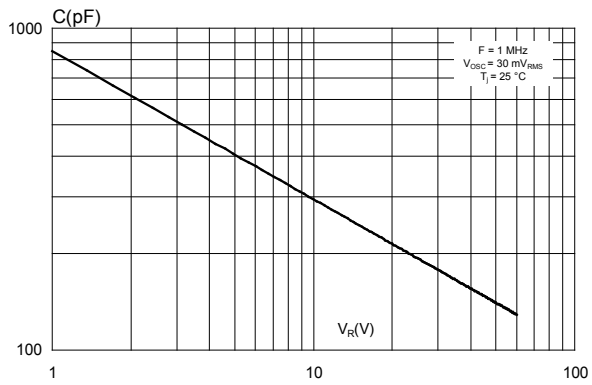


Figure 5. Forward voltage drop versus forward current (typical values)

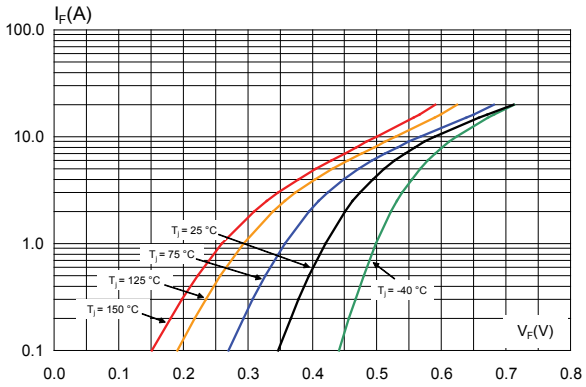


Figure 6. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

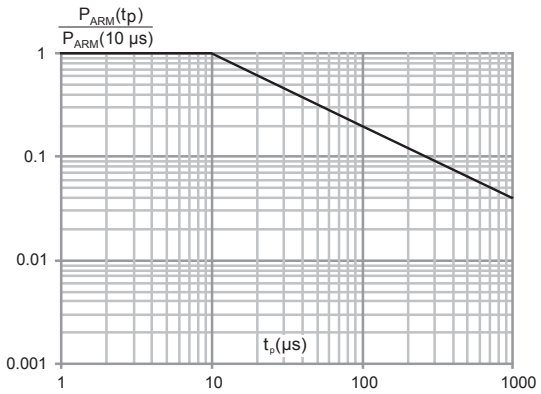
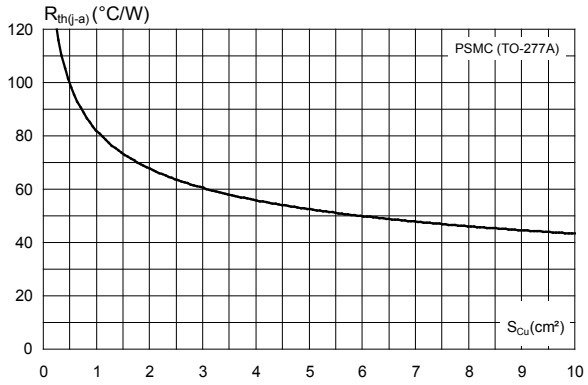


Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu} = 35 µm) (PSMC (TO-277A))



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

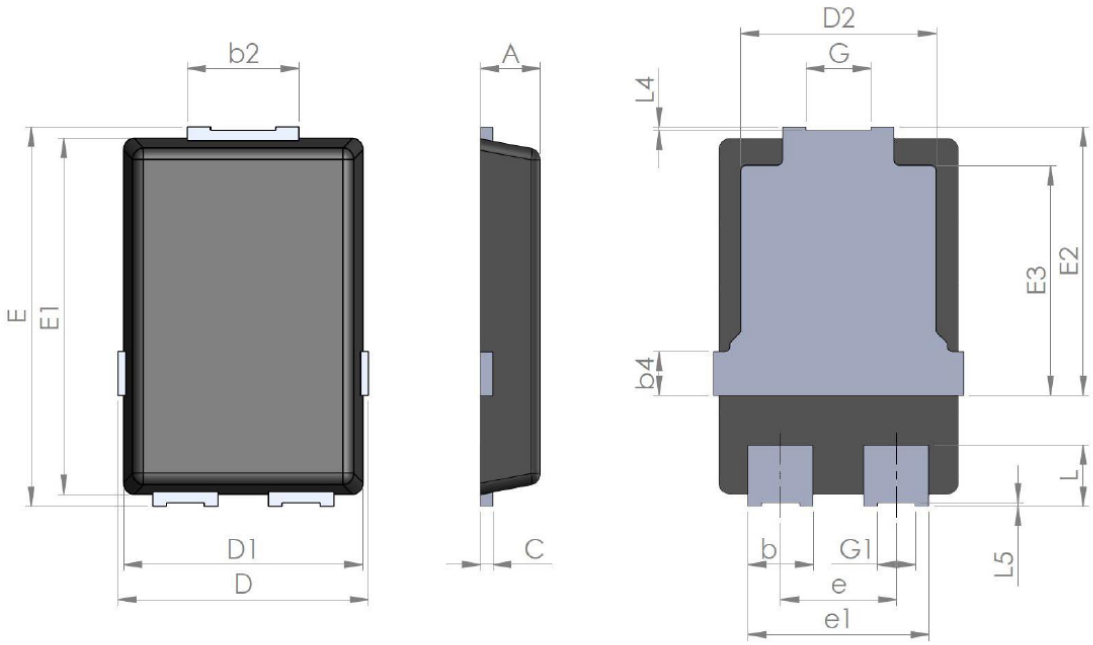


Table 4. PSMC (TO-277A) package mechanical data

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)

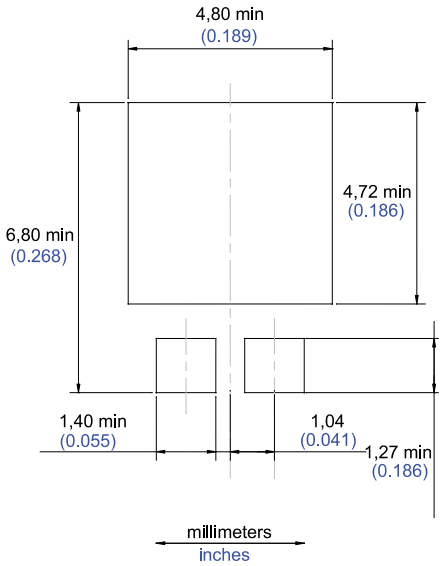
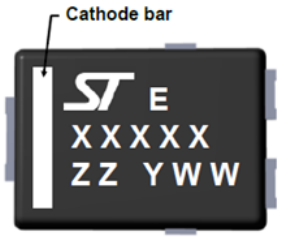
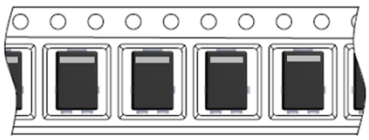


Figure 10. **PSMC (TO-277A) marking**



E : ECOPACK grade
XXXX : Marking
ZZ : Manufacturing location
Y : Year
WW : week

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**

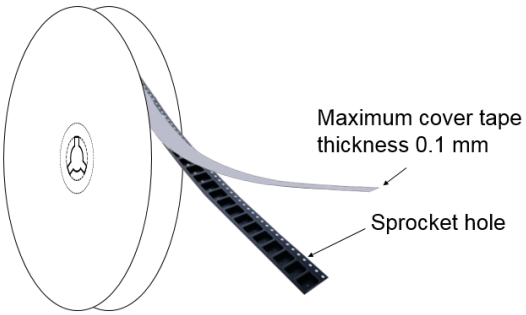


Figure 13. **13" reel dimension values**

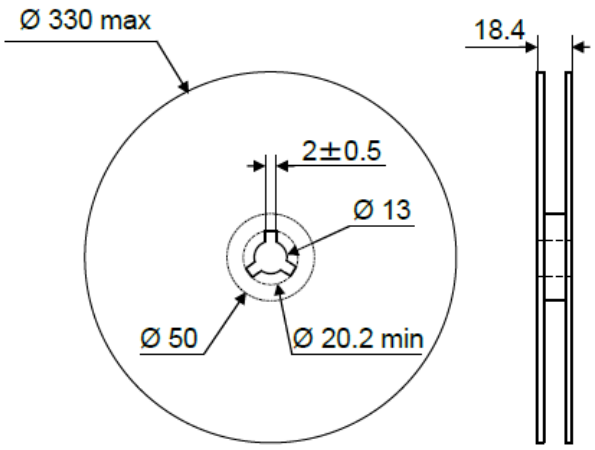


Figure 14. **Inner box dimension values**

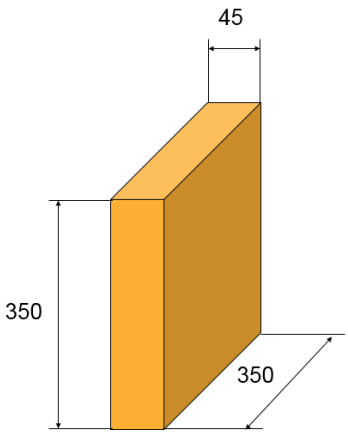
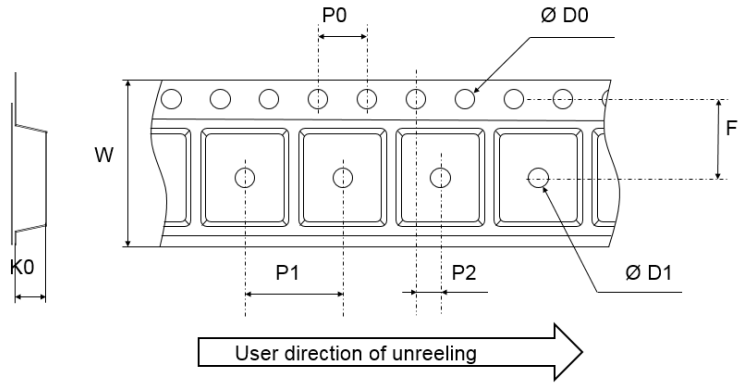


Figure 15. **Tape outline**



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
STPS10M60SFY	S10M60Y	PSMC (TO-277A)	90 mg	6000	Tape and Reel

Revision history

Table 7. **Document revision history**

Date	Version	Changes
06-Aug-2018	1	Initial release.

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