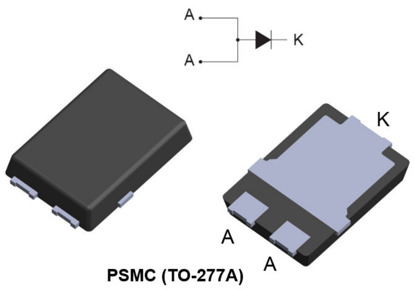
STPST8H100-Y

Datasheet

Automotive 100 V - 8 A power Schottky trench rectifier



Features

- AEC-Q101 qualified
- PPAP capable
- Low forward voltage drop
- Low recovery charges
- Reduces conduction, reverse and switching losses
- 100% Avalanche tested in production
- Operating T_j from -40 °C to +175 °C
- Flat packages
- ECOPACK2 compliant

Applications

- Automotive LED lighting
- Flyback topology
- On-board DC/DC converter
- ECU power supply

Description

This 8 A, 100 V rectifier is based on ST trench technology that achieves the best-in-class V_F/I_R trade-off for a given silicon surface.

Integrated in flat and space-saving packages, this STPST8H100-Y trench, and automotive-graded device is intended to be used in high frequency miniature switched mode power supplies such as in automotive, DC/DC converters or ECU power supply. It is also adapted to freewheeling applications, OR-ring, or reverse polarity protection.

Product label

Product status link
STPST8H100-Y

Product summary	
$I_{F(AV)}$	8 A
V_{RRM}	100 V
T_j (max.)	175 °C
V_F (typ.)	0.560 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)		100	V
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	T_c = 155 °C	8	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	200	A
I_{AS}	Single pulse avalanche current(1)	T_j = 25°C, L = 300 µH, V_{DD} = 15 V	12	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature range(2)		-40 to +175	°C

1. *Please refer to Figure 1 and Figure 2 for the unclamped inductive switching test circuit, and waveform.*
2. *(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 parameter

Symbol	Parameter	Typ. value	Unit
$R_{th(j-c)}$	Junction to case	1.4	°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

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 125 °C	V_R = 70 V	-	1.5	4.6	mA
		T_j = 25 °C	V_R = 100 V	-		17	µA
		T_j = 125 °C		-	3	10	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 4 A	-	0.530	0.590	V
		T_j = 125 °C		-	0.460	0.515	
		T_j = 25 °C	I_F = 8 A	-	0.625	0.695	
		T_j = 125 °C		-	0.560	0.615	

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:

$P = 0.415 \times I_{F(AV)} + 0.025 \times I_{F}^{2}{}_{(RMS)}$

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 on a power diode

Figure 1. Current and voltage waveforms for avalanche energy test across D.U.T (device under test)

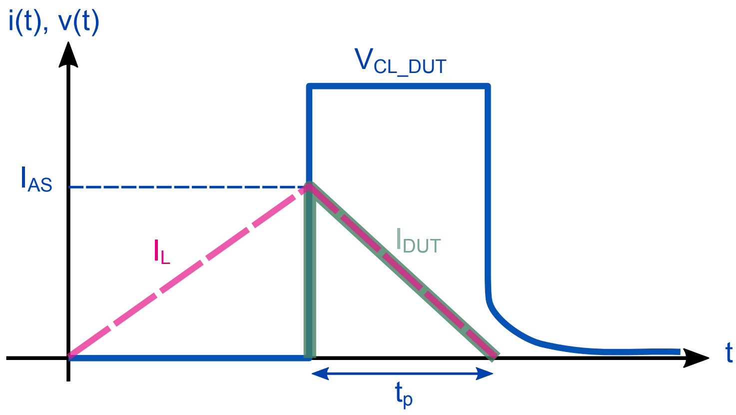
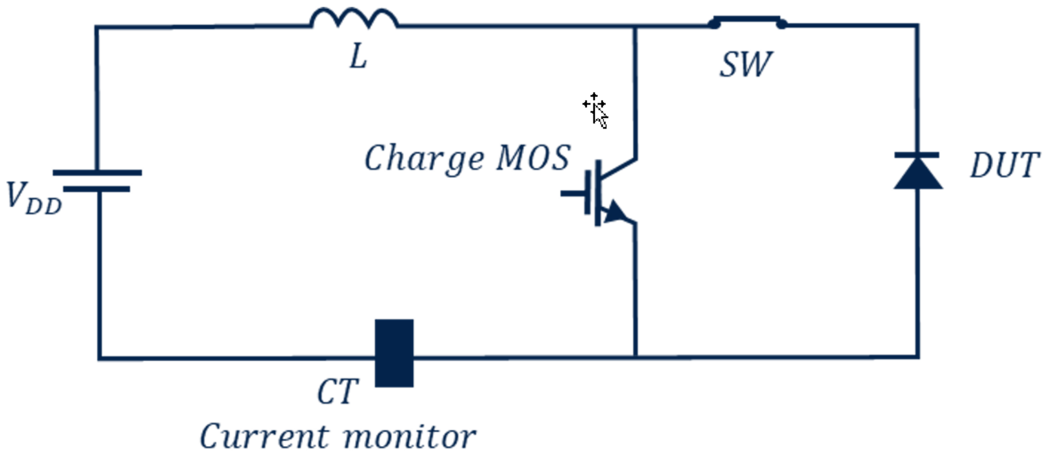


Figure 2. Unclamped Inductive Switching Test circuit



$$E_{AS} = \frac{1}{2} \times L \times {I_{AS}}^2 \times \left(\frac{V_{CLDUT}}{V_{CLDUT} - V_{DD}} \right) \cong \frac{1}{2} \times L \times {I_{AS}}^2$$

$$t_p = \left(\frac{L \times I_{AS}}{V_{CLDUT} - V_{DD}} \right)$$

1.1 Characteristics (curves)

Figure 3. Average forward current versus case temperature (δ = 0.5)

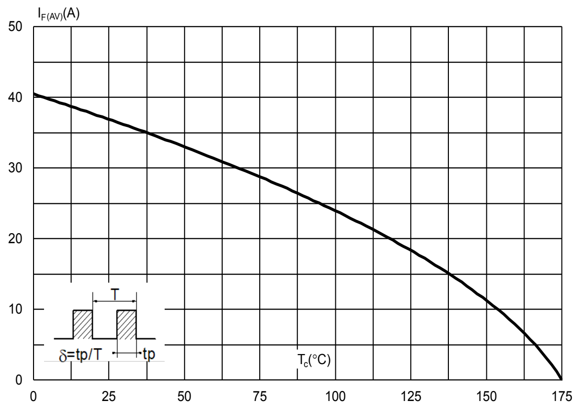


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

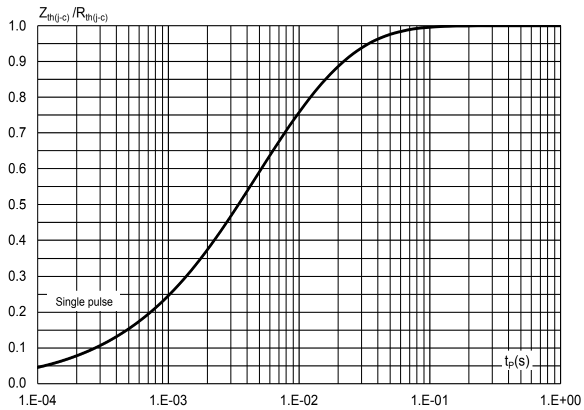


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

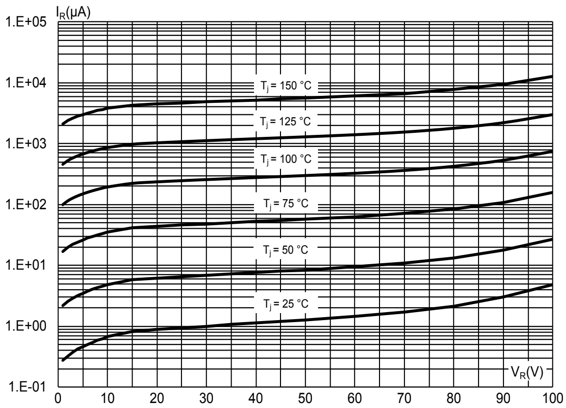


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

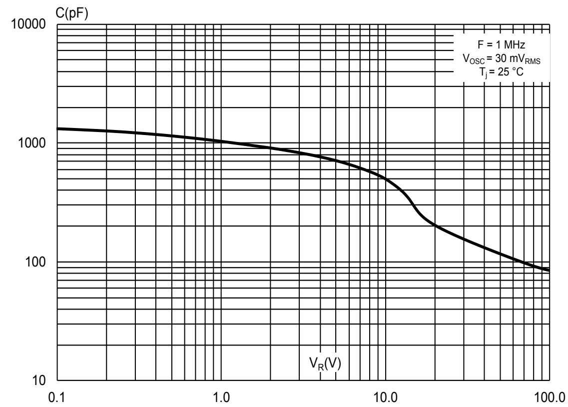


Figure 7. Forward voltage drop versus forward current (typical values)

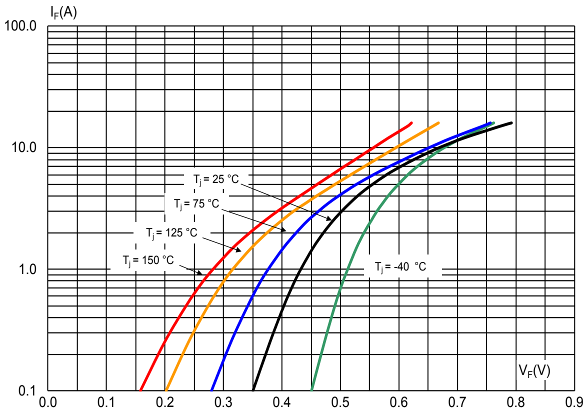
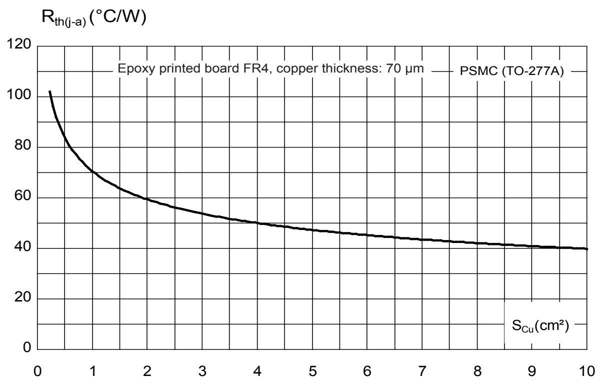


Figure 8. Thermal resistance junction to ambient versus copper surface under tab (typical values, epoxy printed board FR4, e_{Cu}= 70 µm)



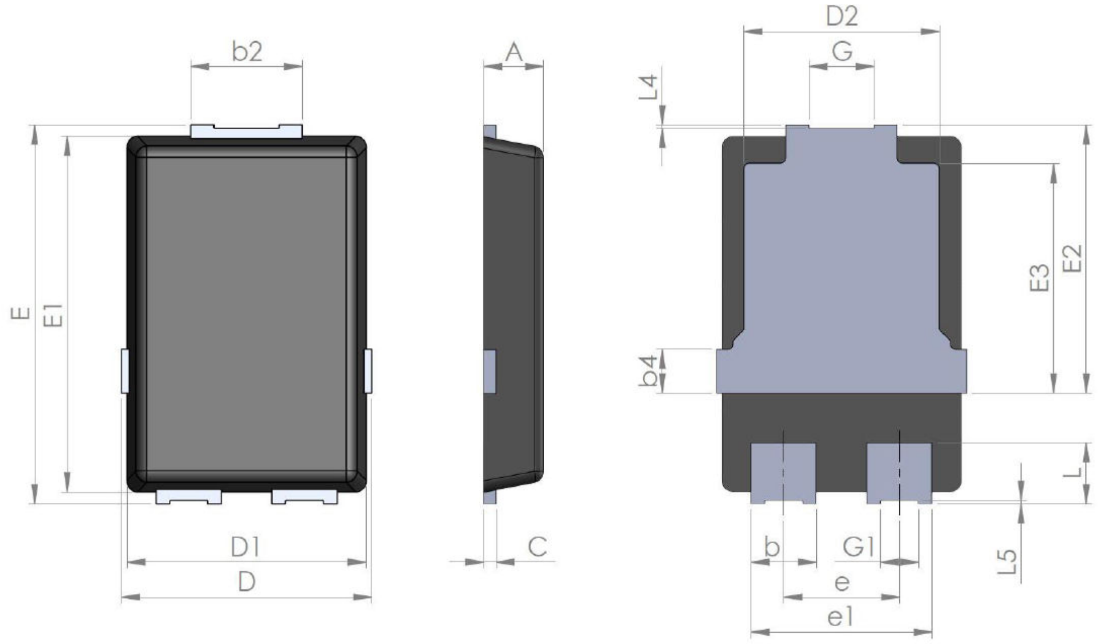
2 Package information

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 9. **PSMC (TO-277A) package outline**

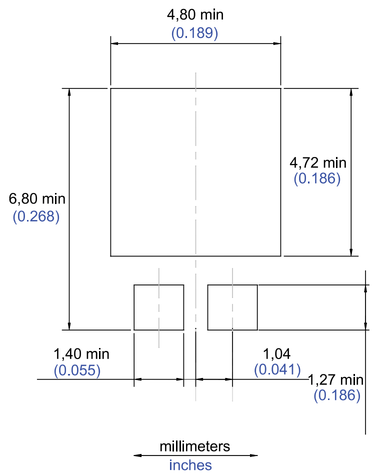


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

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 10. 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
STPST8H100SFY	T8H1Y	PSMC (TO-277A)	90.0 mg	6000	Tape and reel

Revision history

Table 6. **Document revision history**

Date	Revision	Changes
02-Jan-2023	1	Initial release.
24-Jul-2023	2	Updated *Features*.