## Automotive 100 V - 3 A power Schottky trench diode

SOD128Flat
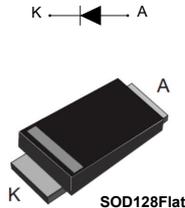
Features

- 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 3 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 STPST3H100-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
STPST3H100-Y

Product summary	
$I_{F(AV)}$	3 A
V_{RRM}	100 V
T_j (max.)	175 °C
V_F (typ.)	0.600 V

DS13611 - Rev 2 - July 2023
For further information contact your local STMicroelectronics sales office.

www.st.com

1   Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)

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_l = 130 °C[1]	3	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	50	A
I_{AS}	Surge non repetitive forward current[2]	T_j = 25°C, L = 300 µH, V_{DD} = 15 V	5	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature range[3]		-40 to +175	°C

1. *Value based on $R_{th(j-l)}$(max.).*

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

3. *(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
$R_{th(j-l)}$	Junction to lead	SOD128Flat	13	°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	-	0.45	1.4	mA
		T_j = 25 °C	V_R = 100 V	-		5.7	µA
		T_j = 125 °C		-	0.8	3.0	mA
V_F[2]	Forward voltage drop	T_j = 25 °C	I_F = 1.5 A	-	0.565	0.625	V
		T_j = 125 °C		-	0.500	0.555	
		T_j = 25 °C	I_F = 3 A	-	0.685	0.755	
		T_j = 125 °C		-	0.600	0.650	

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:

$P = 0.46 \times I_{F(AV)} + 0.0633 \times I_{F}^2{}_{(RMS)}$

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)
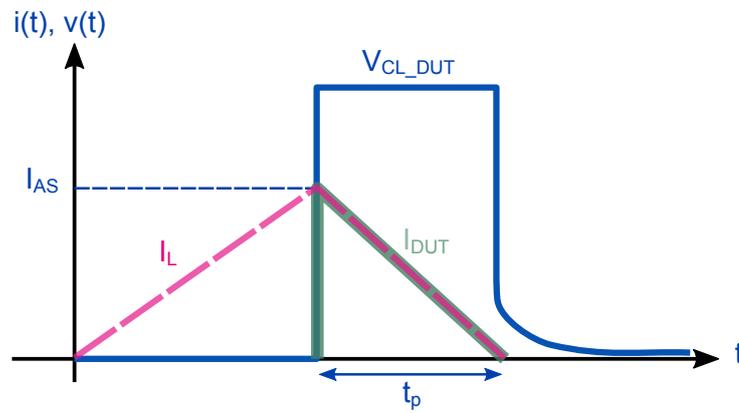
**Figure 2. Unclamped Inductive Switching Test circuit**
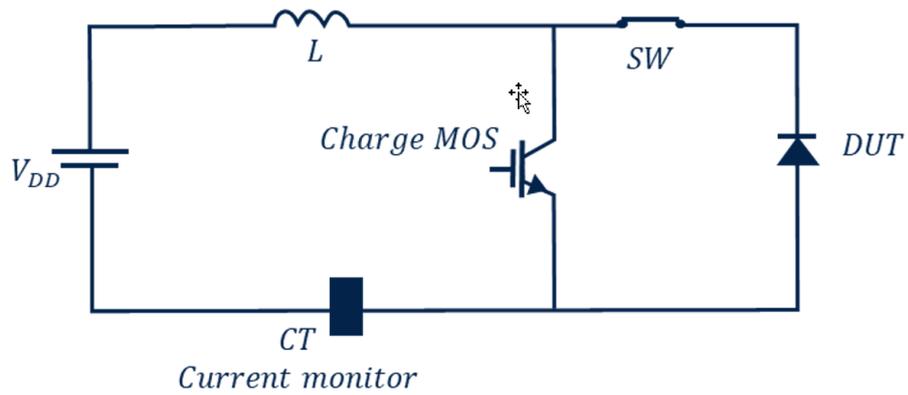
$$E_{AS} = \frac{1}{2} \times L \times I_{AS}^2 \times \left(\frac{V_{CLDUT}}{V_{CLDUT} - V_{DD}} \right) \cong \frac{1}{2} \times L \times I_{AS}^2$$

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

1.1 Characteristics (curves)

Figure 3. Average forward current versus lead temperature (δ = 0.5)
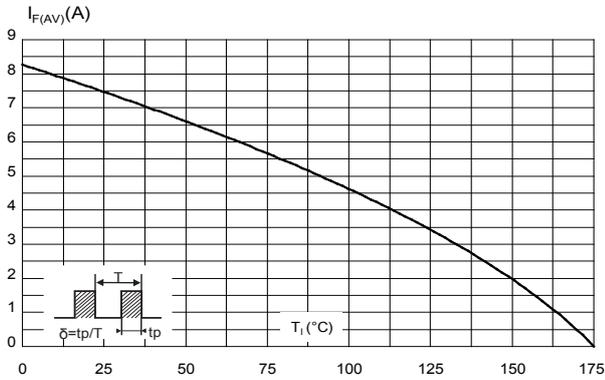
Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration
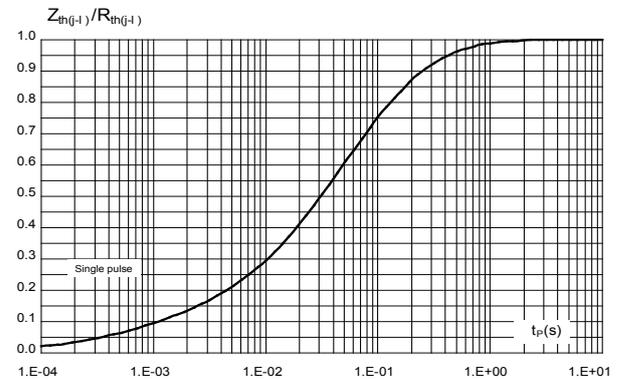
Figure 5. Reverse leakage current versus reverse voltage applied (typical values)
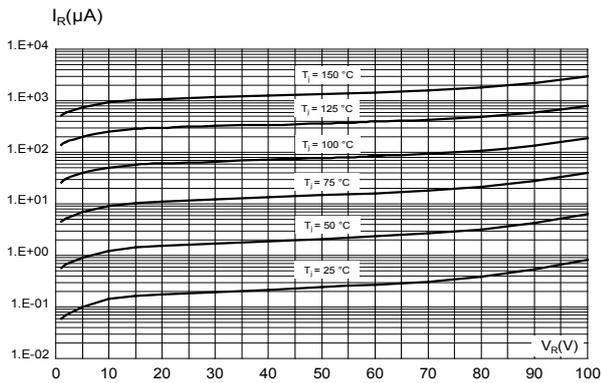
Figure 6. Junction capacitance versus reverse voltage applied (typical values)
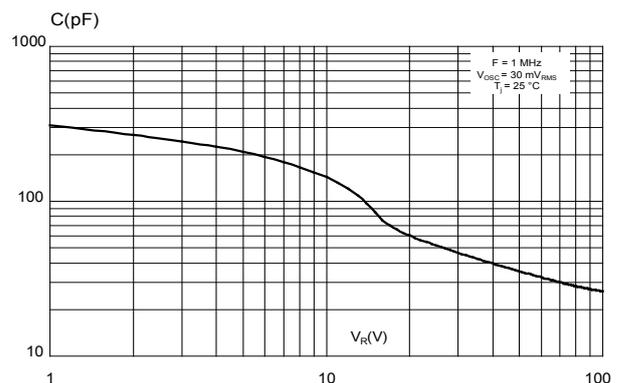

**Figure 7. Forward voltage drop versus forward current (typical values)**
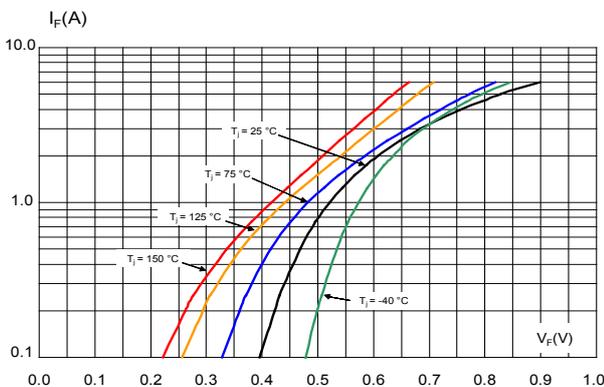
Figure 8. Thermal resistance junction to ambient versus copper surface under each lead (typical values, epoxy printed board FR4, e_{Cu}= 70 μm)
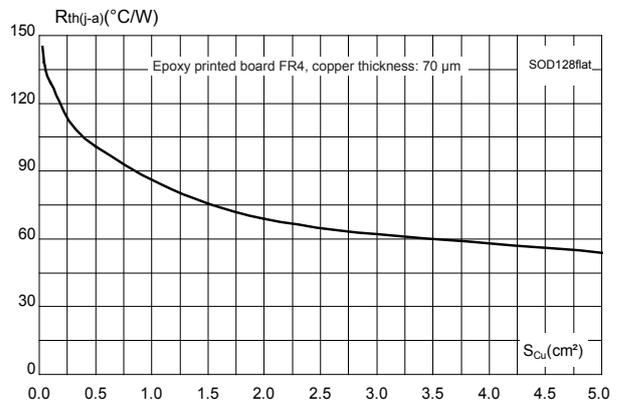
2 Package information

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 SOD128Flat package information

- Lead-free package

Figure 9. SOD128Flat package outline
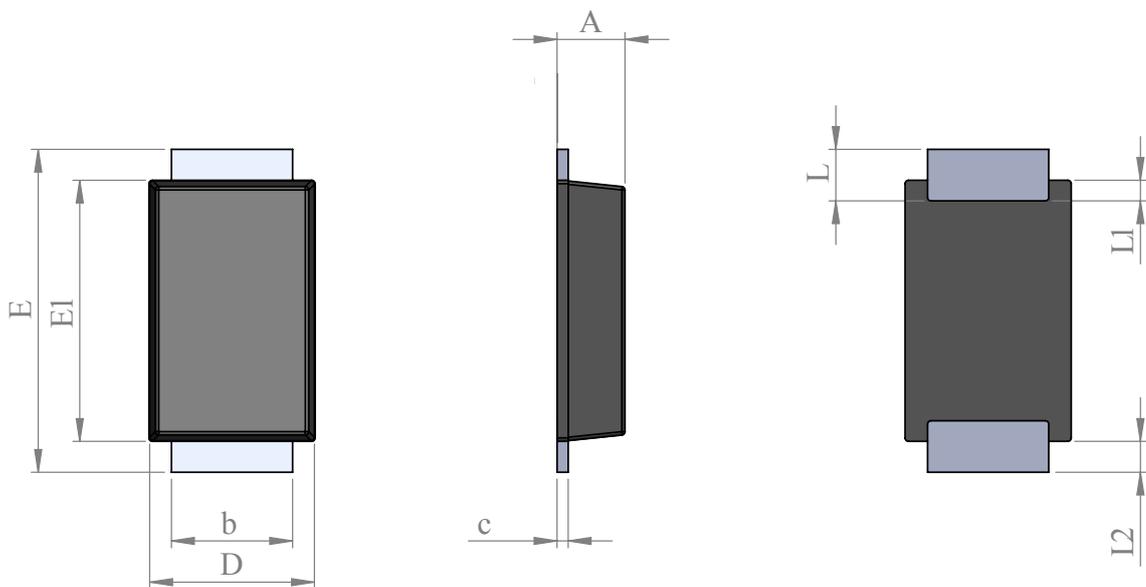
Note: *This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

Table 4. SOD128Flat package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.93	1.03	0.037	0.041
b	1.69	1.81	0.067	0.071
c	0.10	0.22	0.004	0.009
D	2.30	2.50	0.091	0.098
E	4.60	4.80	0.181	0.189
E1	3.70	3.90	0.146	0.154
L	0.55	0.85	0.026	0.033
L1	0.30 typ.		0.012 typ.	
L2	0.45 typ.		0.018 typ.	

Figure 10. SOD128Flat footprint in mm (inches)
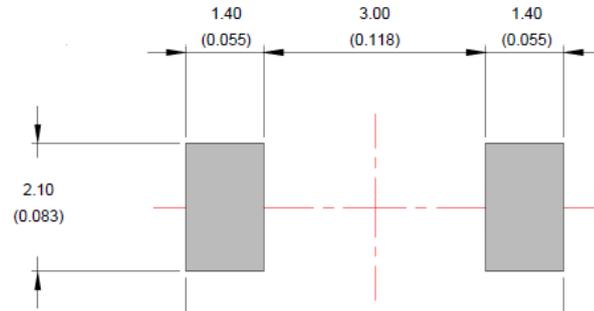
Note: For package and tape orientation, reel and inner box dimensions and tape outline please check TN1173.

3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPST3H100AFY	T3H1Y	SOD128Flat	26.4 mg	3000	Tape and reel

Revision history

Table 6. Document revision history

Date	Version	Changes
28-Jan-2021	1	Initial release.
25-Jul-2023	2	Updated Table 1 and Figure 9. SOD128Flat package outline. Added Figure 1 and Figure 2.

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