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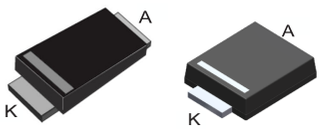
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STPST3H100

Datasheet

100 V - 3 A power Schottky trench rectifier





SOD128Flat SMB Flat

Features

- High junction temperature capability
- Low forward voltage drop
- Low recovery charges
- Reduces conduction, reverse and switching losses
- Avalanche tested
- Flat packages
- ECOPACK2 compliant

Applications

- DC/DC converter
- LED lighting
- Flyback topology
- Auxiliary power supply
- Switch mode power supply (SMPS)

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 trench rectifier is intended to be used in high frequency miniature switched mode power supplies. It is also an ideal candidate for auxiliary power supply in telecom, server, or smart metering. ST trench rectifiers are adapted to freewheeling, OR-ring or reverse polarity protection applications, and can be the perfect companion device to our transistors, drivers, or ST VIPer products.

Product label
SUSTAINABLE TECHNOLOGY

Product status link
STPST3H100

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

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1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			100	V
$I_{F(AV)}$	Average forward current, δ = 0.5 square wave	SOD128Flat	T_l = 130 °C	3	A
		SMB Flat	T_l = 140 °C		
I_{FSM}	Surge non repetitive forward current	SOD128Flat	t_p = 10 ms sinusoidal	50	A
		SMB Flat		55	
I_{AS}	Single pulse avalanche current(1)	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(2)			+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
$R_{th(j-l)}$	Junction to lead	SOD128Flat	13	°C/W
		SMB Flat	10	

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

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

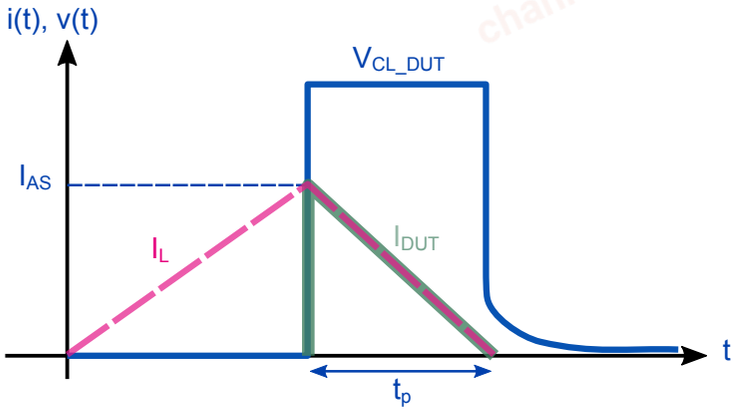
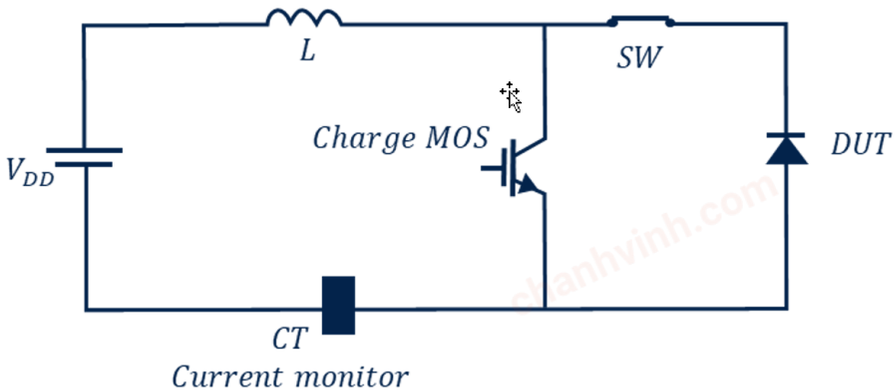


Figure 2. **Unclamped inductive switching test circuit**



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

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

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1.1 Characteristics (curves)

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

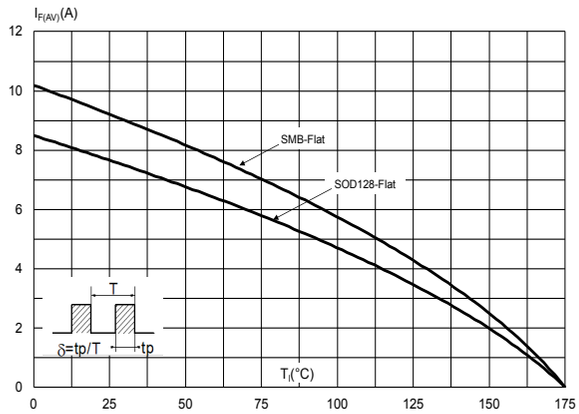


Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration (SOD128Flat)

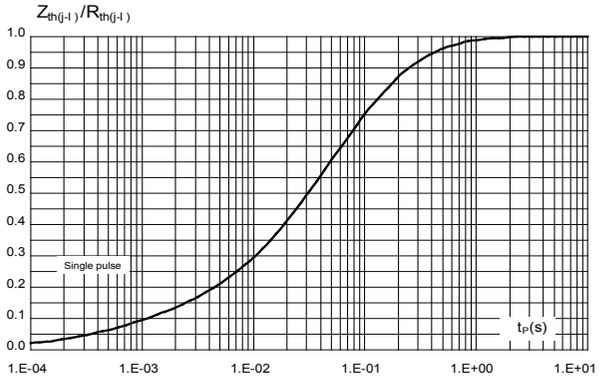


Figure 5. Relative variation of thermal impedance junction to lead versus pulse duration (SMB Flat)

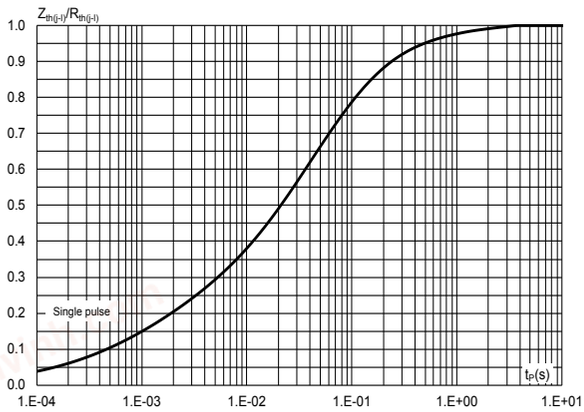


Figure 6. Reverse leakage current versus reverse voltage applied (typical values)

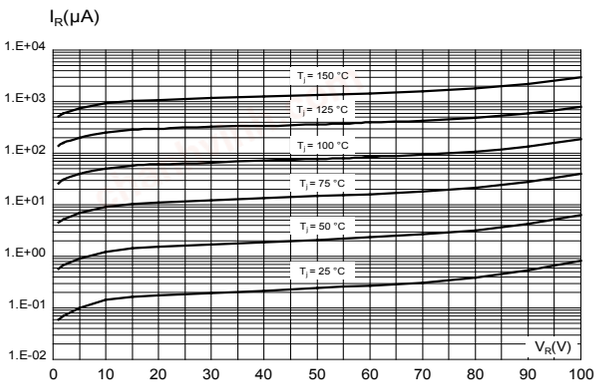


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

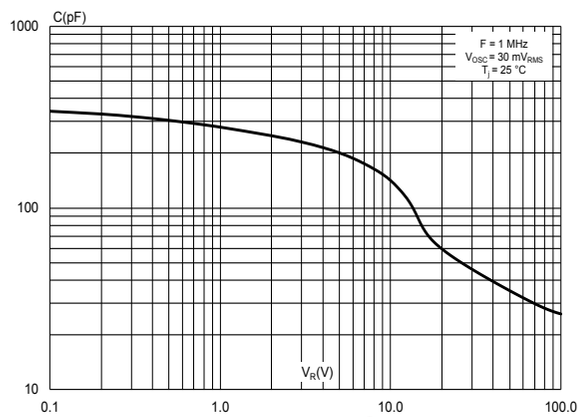
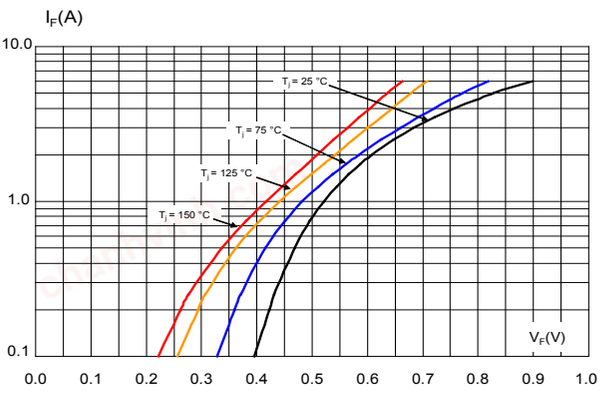


Figure 8. Forward voltage drop versus forward current (typical values)



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Figure 9. Thermal resistance junction to ambient versus copper surface under each lead (typical values, epoxy printed board FR4, e_{Cu}= 70 µm)

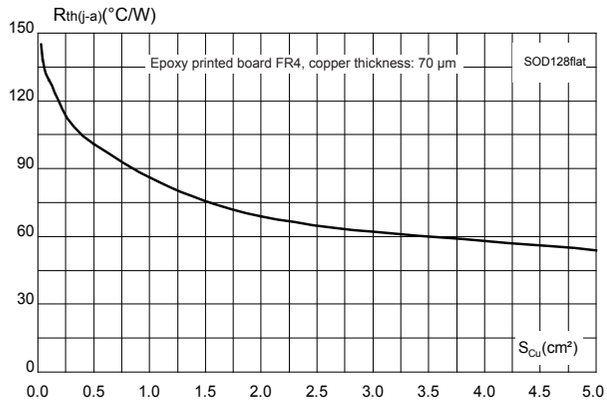
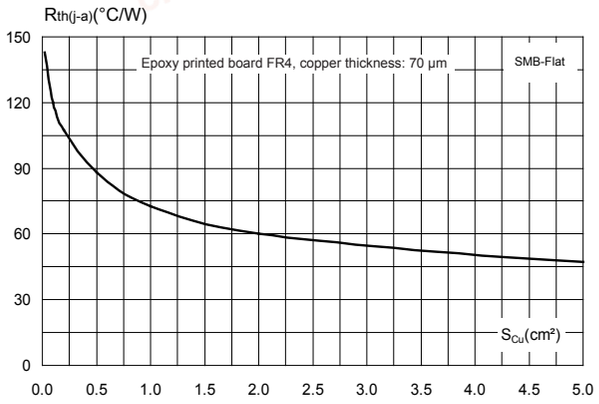


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead (typical values, epoxy printed board FR4, e_{Cu}= 70 µm)



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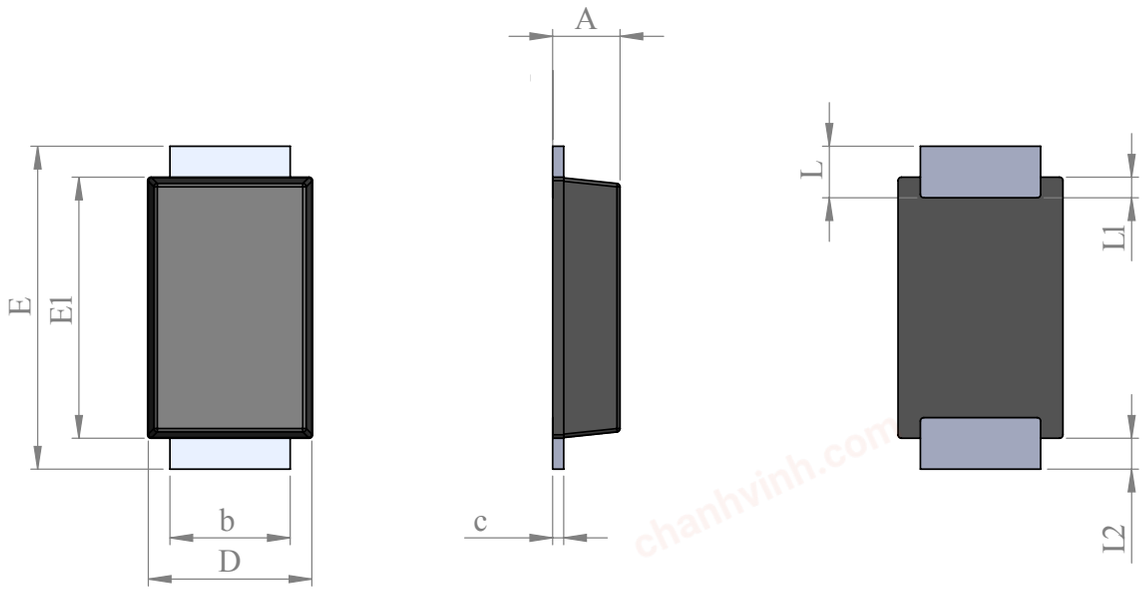
2 Package information

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 11. SOD128Flat package outline



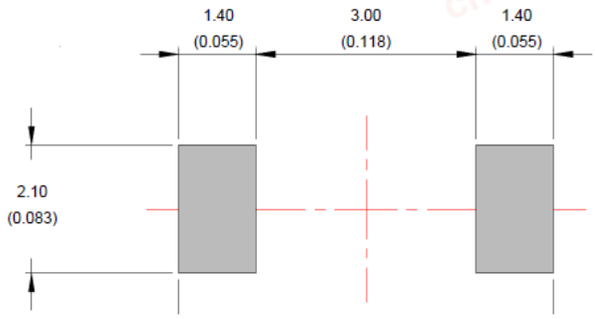
Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

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.	

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Figure 12. **SOD128Flat footprint in mm (inches)**



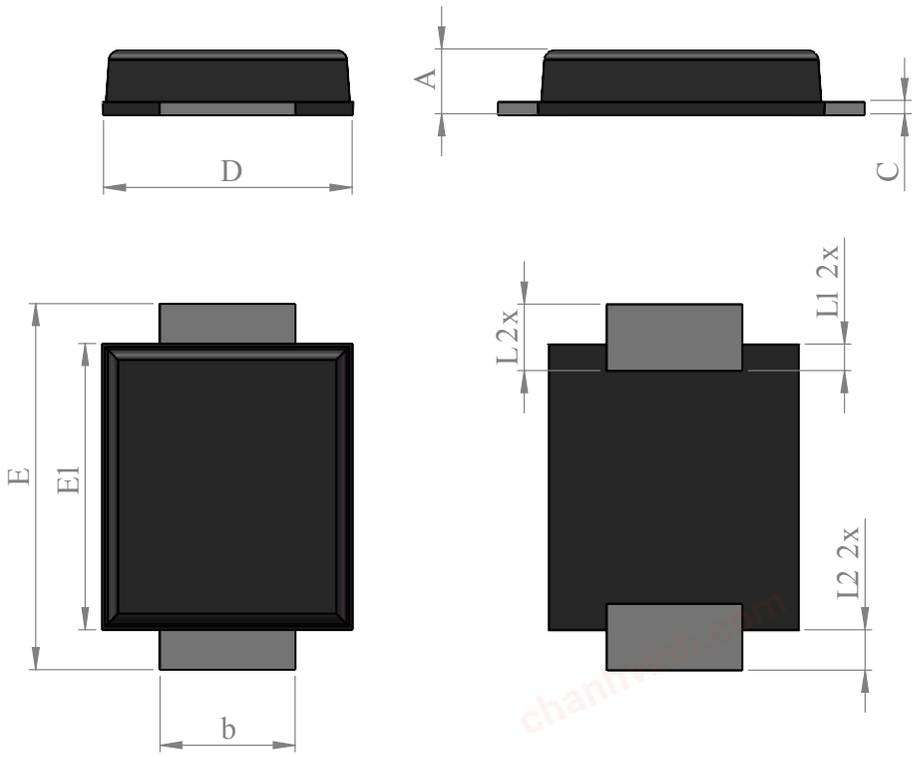
Note: For package and tape orientation, reel and inner box dimensions and tape outline please check TN1173.

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2.2 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 13. SMB Flat package outline



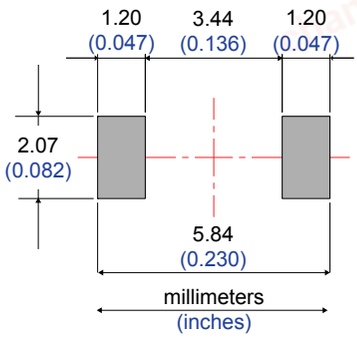
Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. SMB Flat mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.10	0.035		0.044
b	1.95		2.20	0.076		0.087
C	0.15		0.40	0.005		0.016
D	3.30		3.95	0.129		0.156
E	5.10		5.60	0.200		0.221
E1	4.05		4.60	0.159		0.182
L	0.75		1.50	0.029		0.060
L1		0.40			0.016	
L2		0.60			0.024	

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Figure 14. Footprint recommendations, dimensions in mm (inches)



Note: For package and tape orientation, reel and inner box dimensions and tape outline please check TN1173.

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3 Ordering information

Table 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPST3H100AF	T3H1	SOD128Flat	26.4 mg	3000	Tape and reel
STPST3H100UF	T3H1	SMB Flat	50.0 mg	5000	Tape and reel

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Revision history

Table 7. **Document revision history**

Date	Version	Changes
25-Jan-2021	1	Initial release.
02-Jan-2023	2	Inserted SMB Flat package information. Minor text changes.
01-Jun-2023	3	Updated Table 1 and Figure 11.
21-Jul-2023	4	Updated *Features*.

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