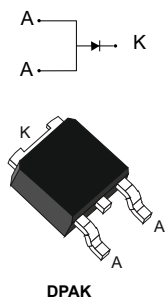



## Automotive 100 V - 5 A DPAK power Schottky trench rectifier



### Features

- AEC-Q101 qualified 
- PPAP capable
- ST trench patented process
- Low forward voltage drop
- Low recovery charges
- Reduces conduction, reverse and switching losses
- 100% Avalanche tested in production
- Operating  $T_j$  from  $-40\text{ }^{\circ}\text{C}$  to  $+175\text{ }^{\circ}\text{C}$
- ECOPACK2 compliant



### Applications

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

### Description

This 5 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 a DPAK package, this STPST5H100SB-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

[STPST5H100SB-Y](#)

#### Product summary

$I_{F(AV)}$	5 A
$V_{RRM}$	100 V
$T_j$ (max.)	175 $^{\circ}\text{C}$
$V_F$ (typ.)	0.550 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 ( $T_J = -40^{\circ}\text{C}$ to $+175^{\circ}\text{C}$ )		100	V
$I_{F(RMS)}$	Forward rms current		45	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$ square wave	$T_c = 165^{\circ}\text{C}$	5	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	150	A
$I_{AS}$	Single pulse avalanche current <sup>(1)</sup>	$T_J = 25^{\circ}\text{C}$ , $L = 300\ \mu\text{H}$ , $V_{DD} = 15\ \text{V}$	9	A
$T_{stg}$	Storage temperature range		-65 to +175	$^{\circ}\text{C}$
$T_J$	Maximum operating junction temperature range <sup>(2)</sup>		-40 to +175	$^{\circ}\text{C}$

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	1.3	$^{\circ}\text{C/W}$

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	$T_J = 125^{\circ}\text{C}$	$V_R = 70\ \text{V}$	-	1.0	3.2	mA
		$T_J = 25^{\circ}\text{C}$	$V_R = 100\ \text{V}$	-		11.5	$\mu\text{A}$
		$T_J = 125^{\circ}\text{C}$		-	2.0	6.5	mA
$V_F^{(2)}$	Forward voltage drop	$T_J = 25^{\circ}\text{C}$	$I_F = 2.5\ \text{A}$	-	0.525	0.575	V
		$T_J = 125^{\circ}\text{C}$		-	0.450	0.510	
		$T_J = 25^{\circ}\text{C}$	$I_F = 5\ \text{A}$	-	0.620	0.685	
		$T_J = 125^{\circ}\text{C}$		-	0.550	0.600	

1. Pulse test:  $t_p = 5\ \text{ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\ \mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.036 \times I_{F(RMS)}^2$$

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)

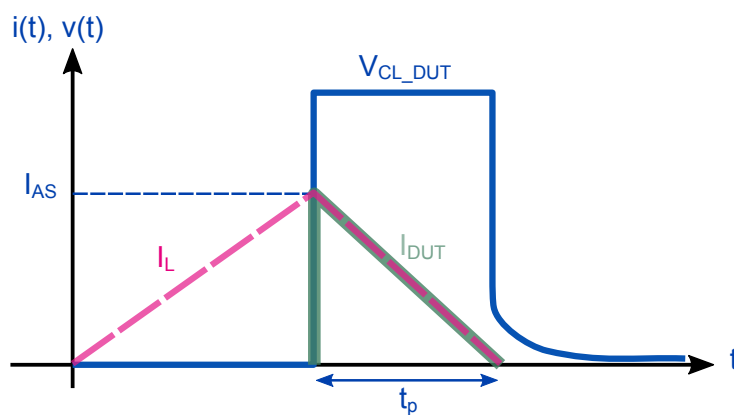
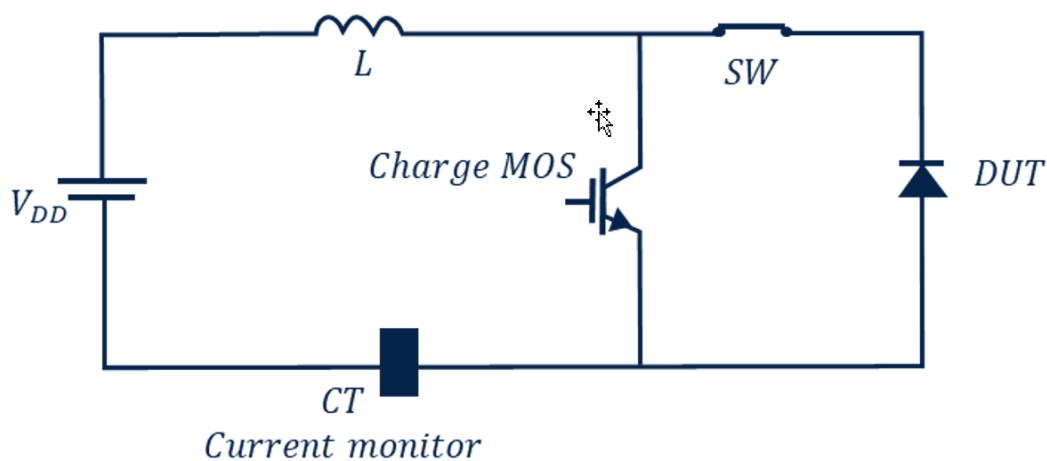


Figure 2. Unclamped Inductive Switching Test circuit

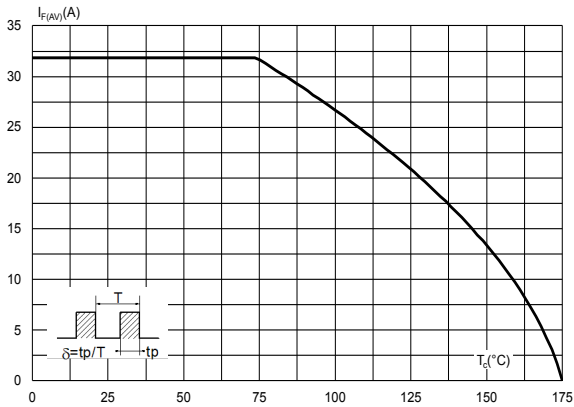


$$E_{AS} = \frac{1}{2} \times L \times I_{AS}^2 \times \left( \frac{V_{CLDUT}}{V_{CLDUT} - V_{DD}} \right) \cong \frac{1}{2} \times L \times I_{AS}^2$$

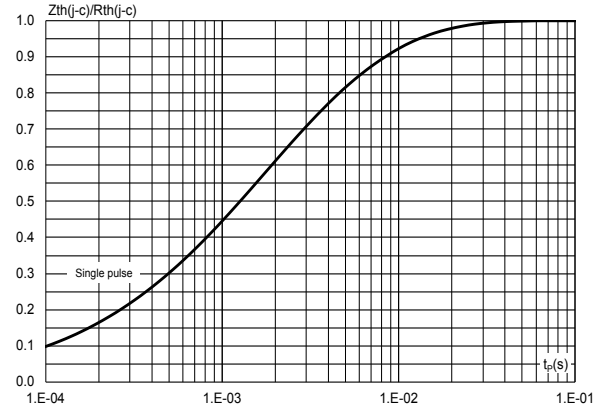
$$t_p = \left( \frac{L \times I_{AS}}{V_{CLDUT} - V_{DD}} \right)$$

## 1.1 Characteristics (curves)

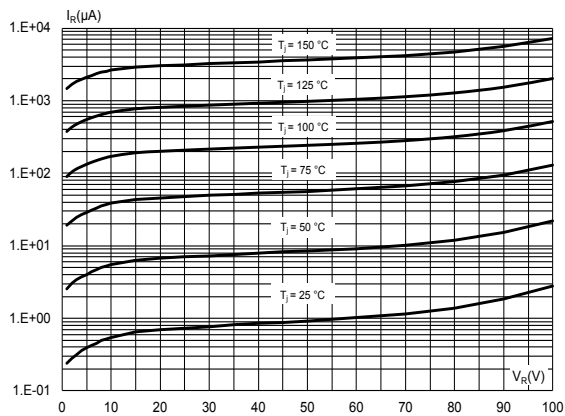
**Figure 3. Average forward current versus case temperature ( $\delta = 0.5$ )**



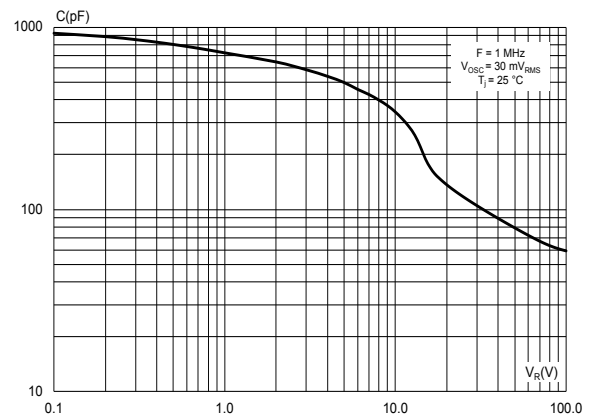
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



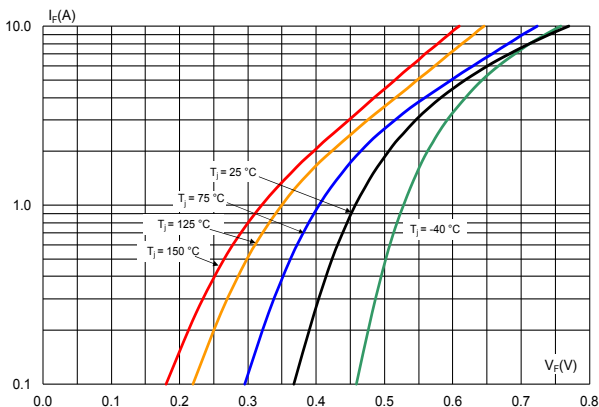
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values)**



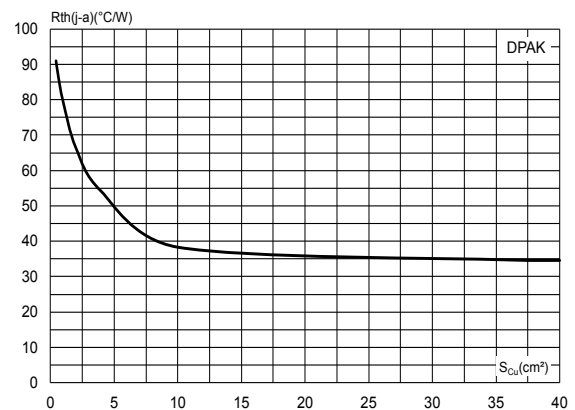
**Figure 6. Junction capacitance versus reverse voltage applied (typical values)**



**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,  $e_{Cu} = 70 \mu m$ )**



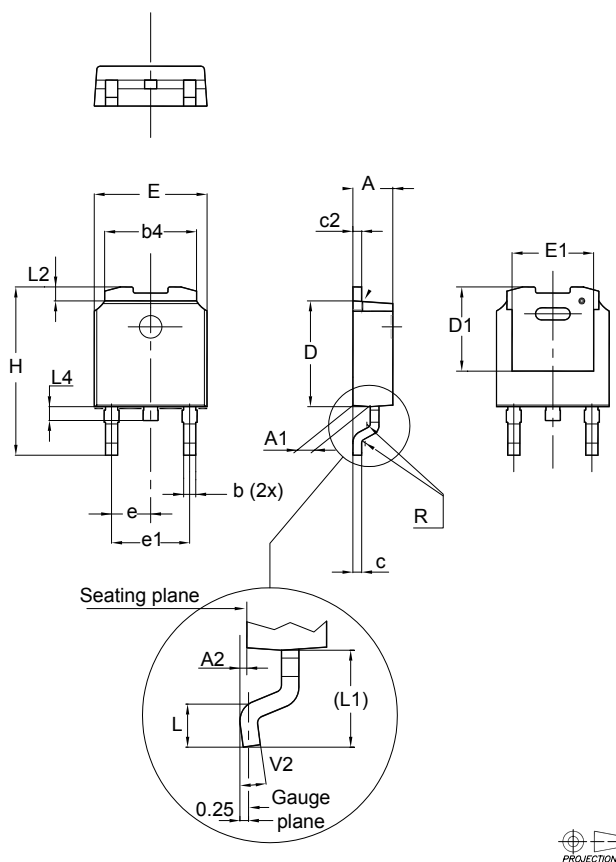
## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 DPAK package information

- Epoxy meets UL94, V0

**Figure 9. DPAK package outline**

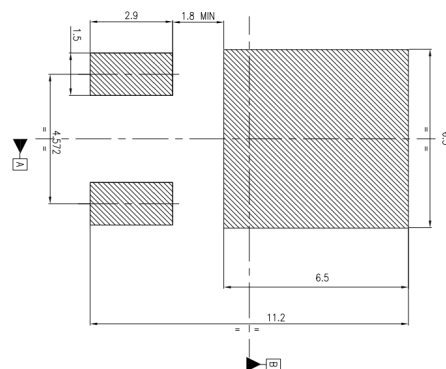


**Note:** This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

**Table 4. DPAK mechanical data**

Dim.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	5.20		5.40	0.205		0.213
c	0.45		0.60	0.018		0.024
c2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
D1	4.95	5.10	5.25	0.195	0.201	0.207
E	6.40		6.60	0.252		0.260
E1	4.60	4.70	4.80	0.181	0.185	0.189
e	2.159	2.286	2.413	0.085	0.090	0.095
e1	4.445	4.572	4.699	0.175	0.180	0.185
H	9.35		10.10	0.368		0.398
L	1.00		1.50	0.039		0.059
(L1)	2.60	2.80	3.00	0.102	0.110	0.118
L2	0.65	0.80	0.95	0.026	0.031	0.037
L4	0.60		1.00	0.024		0.039
R		0.20			0.008	
V2	0°		8°	0°		8°

1. Inches dimensions given for reference only

**Figure 10. DPAK recommended footprint (dimensions are in mm)**


**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
STPST5H100SBY-TR	STPST 5H1Y	DPAK	0.32 g	2500	Tape and reel

## Revision history

**Table 6. Document revision history**

Date	Revision	Changes
16-Dec-2022	1	Initial release.



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