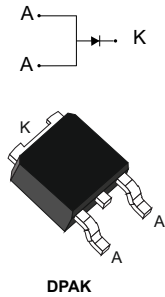


## Automotive 100 V - 15 A DPAK power Schottky trench rectifier



### 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  $-40\text{ }^{\circ}\text{C}$  to  $+175\text{ }^{\circ}\text{C}$
- ECOPACK2 compliant

### Applications

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



#### Product label



#### Product status link

[STPST15H100SB-Y](#)

### Description

This 15 A, 100 V rectifier is based on ST trench technology that achieves the best-inclass  $V_F/I_R$  trade-off for a given silicon surface.

Integrated in a DPAK package, this STPST15H100SB-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 summary

|              |                        |
|--------------|------------------------|
| $I_{F(AV)}$  | 15 A                   |
| $V_{RRM}$    | 100 V                  |
| $T_j$ (max.) | 175 $^{\circ}\text{C}$ |
| $V_F$ (typ.) | 0.595 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                                       | $T_c = 165^{\circ}\text{C}$                                                      | 15          | A                  |
| $I_{FSM}$    | Surge non repetitive forward current                                                      | $t_p = 10$ ms sinusoidal                                                         | 230         | A                  |
| $I_{AS}$     | Single pulse avalanche current <sup>(1)</sup>                                             | $T_J = 25^{\circ}\text{C}$ , $L = 300\ \mu\text{H}$ ,<br>$V_{DD} = 15\ \text{V}$ | 16          | 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 | 0.6        | $^{\circ}\text{C/W}$ |

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 | $T_J = 125^{\circ}\text{C}$ | $V_R = 70\ \text{V}$  | -    | 2.6   | 7.5   | mA            |
|             |                         | $T_J = 25^{\circ}\text{C}$  | $V_R = 100\ \text{V}$ | -    |       | 28    | $\mu\text{A}$ |
|             |                         | $T_J = 125^{\circ}\text{C}$ |                       | -    | 5     | 16    | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_J = 25^{\circ}\text{C}$  | $I_F = 7.5\ \text{A}$ | -    | 0.555 | 0.645 | V             |
|             |                         | $T_J = 125^{\circ}\text{C}$ |                       | -    | 0.485 | 0.545 |               |
|             |                         | $T_J = 25^{\circ}\text{C}$  | $I_F = 15\ \text{A}$  | -    | 0.665 | 0.740 |               |
|             |                         | $T_J = 125^{\circ}\text{C}$ |                       | -    | 0.595 | 0.650 |               |

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:

$$P = 0.44 \times I_{F(AV)} + 0.014 \times I_{F(RMS)}^2$$

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)

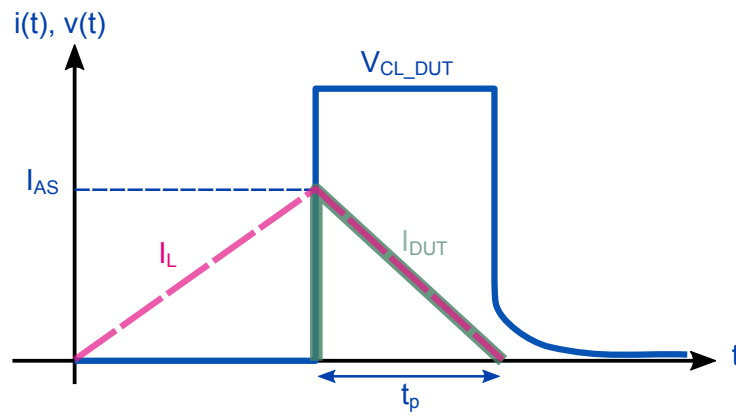
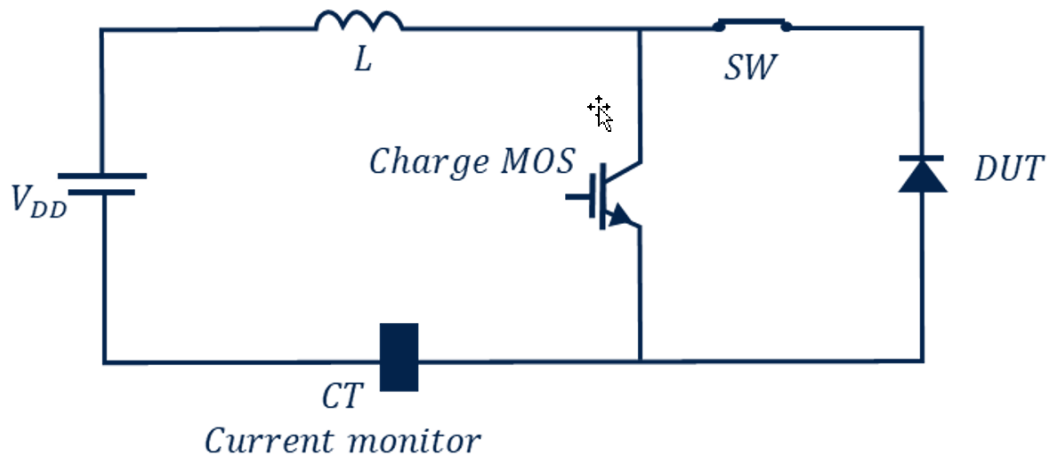


Figure 2. Unclamped inductive switching test circuit

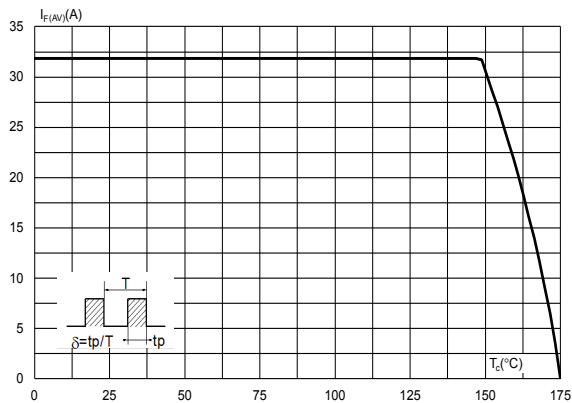


$$E_{AS} = \frac{1}{2} \times L \times I_{AS}^2 \times \left( \frac{V_{CLDUT}}{V_{CLDUT} - V_{DD}} \right) \cong \frac{1}{2} \times L \times I_{AS}^2$$

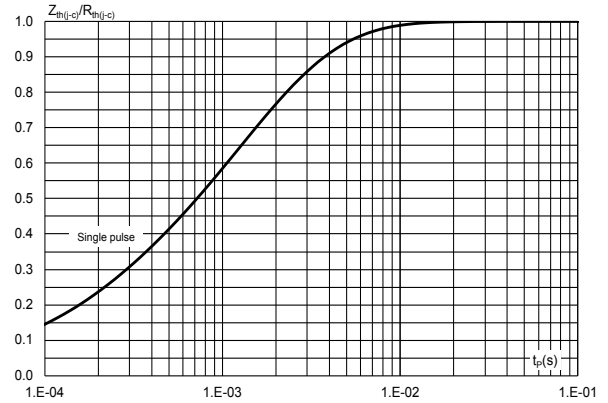
$$t_p = \left( \frac{L \times I_{AS}}{V_{CLDUT} - V_{DD}} \right)$$

## 1.1 Characteristics (curves)

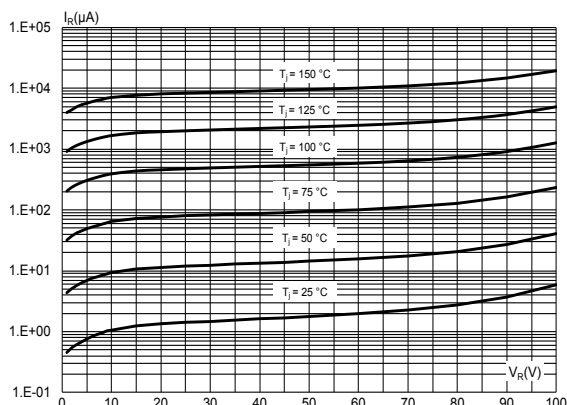
**Figure 3. Average forward current versus case temperature ( $\delta = 0.5$ )**



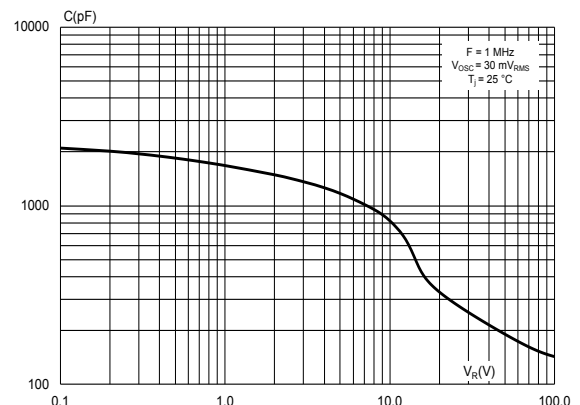
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



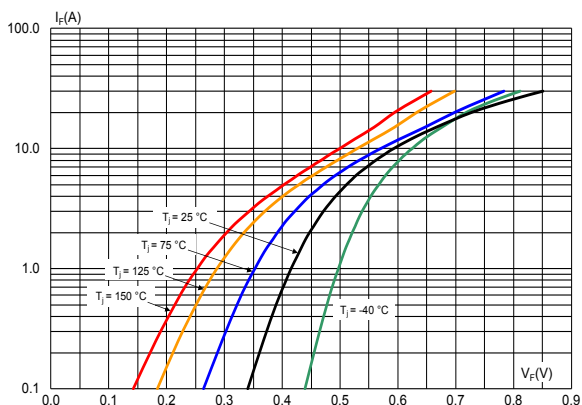
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values)**



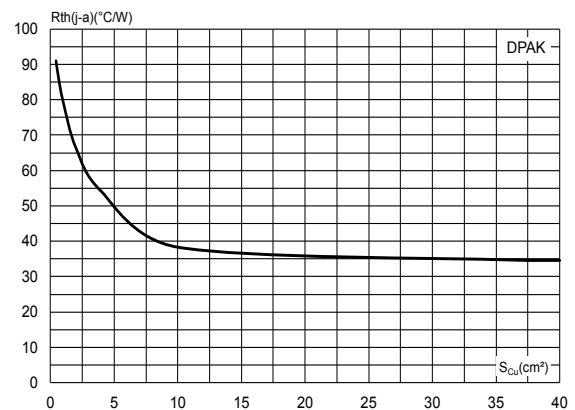
**Figure 6. Junction capacitance versus reverse voltage applied (typical values)**



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



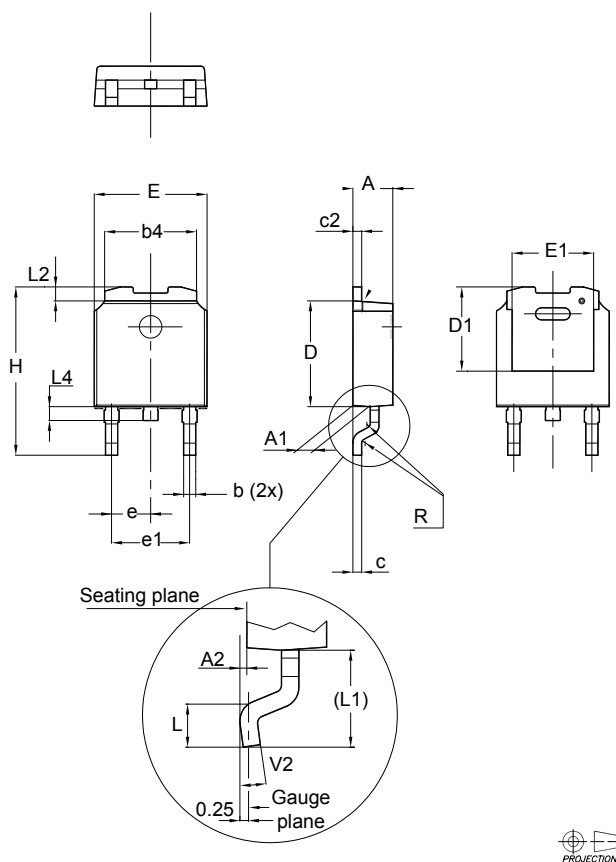
## 2 Package information

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**

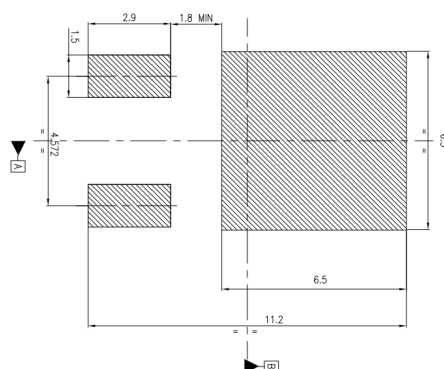


**Note:** This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

**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 |
|------------------|-------------|---------|--------|-----------|---------------|
| STPST15H100SBYTR | STPST 15H1Y | DPAK    | 0.32 g | 2500      | Tape and reel |

## Revision history

Table 6. Document revision history

| Date        | Revision | Changes                   |
|-------------|----------|---------------------------|
| 16-Dec-2022 | 1        | Initial release.          |
| 24-Jul-2023 | 2        | Updated <i>Features</i> . |

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