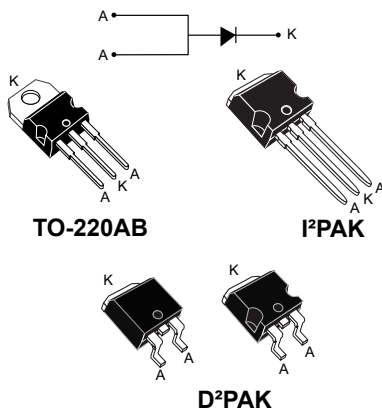


## 100 V, 30 A power Schottky rectifier



### Features

- High current capability
- Avalanche rated
- Low forward voltage drop
- High frequency operation
- **ECOPACK®2** compliant components (for D²PAK on demand)

### Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Desktop power supply

### Description

This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB, D²PAK and I²PAK, the **STPS30SM100S** is optimized for use in notebook and game station adapters, providing in these applications a good efficiency at both low and high load.

#### Product status link

[STPS30SM100S](#)

#### Product summary

|              |        |
|--------------|--------|
| $I_{F(AV)}$  | 30 A   |
| $V_{RRM}$    | 100 V  |
| $T_j$ (max.) | 150 °C |
| $V_F$ (typ.) | 0.63 V |

## 1 Characteristics

**Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified)**

| Symbol              | Parameter                                             |                                                      | Value       | Unit |
|---------------------|-------------------------------------------------------|------------------------------------------------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                                      | 100         | V    |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                                      | 60          | A    |
| I <sub>F(AV)</sub>  | Average forward current $\delta = 0.5$ , square wave  | T <sub>c</sub> = 125 °C                              | 30          | A    |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | t <sub>p</sub> = 10 ms sinusoidal                    | 400         | A    |
| P <sub>ARM</sub>    | Repetitive peak avalanche power                       | t <sub>p</sub> = 10 $\mu$ s, T <sub>j</sub> = 125 °C | 1545        | W    |
| T <sub>stg</sub>    | Storage temperature range                             |                                                      | -65 to +175 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature <sup>(1)</sup> |                                                      | 150         | °C   |

1.  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance parameter**

| Symbol               | Parameter        | Max. value | Unit |
|----------------------|------------------|------------|------|
| R <sub>th(j-c)</sub> | Junction to case | 1          | °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 (with terminals 1 and 3 short circuited)**

| Symbol                        | Parameter               | Test conditions         |                                   | Min. | Typ. | Max. | Unit    |
|-------------------------------|-------------------------|-------------------------|-----------------------------------|------|------|------|---------|
| I <sub>R</sub> <sup>(1)</sup> | Reverse leakage current | T <sub>j</sub> = 25 °C  | V <sub>R</sub> = V <sub>RRM</sub> | -    |      | 45   | $\mu$ A |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -    | 15   | 45   | mA      |
| V <sub>F</sub> <sup>(2)</sup> | Forward voltage drop    | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 5 A              | -    | 500  |      | mV      |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -    | 420  |      |         |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 10 A             | -    | 600  | 670  |         |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -    | 505  | 560  |         |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 30 A             | -    | 780  | 870  |         |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -    | 630  | 690  |         |

1. Pulse test: t<sub>p</sub> = 5 ms,  $\delta < 2\%$

2. Pulse test: t<sub>p</sub> = 380  $\mu$ s,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

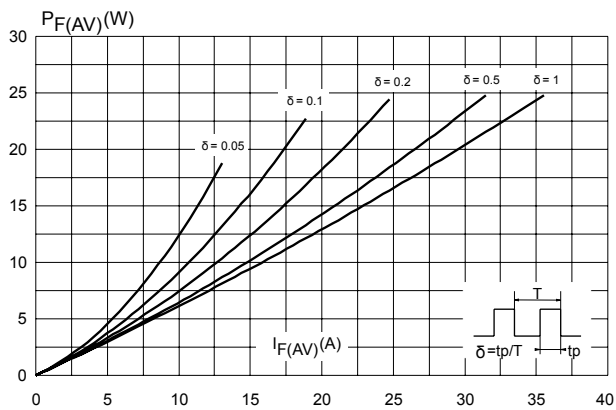
$$P = 0.580 \times I_{F(AV)} + 0.0033 \times I_F^2 (RMS)$$

For more information, please refer to the following application notes related to the power losses:

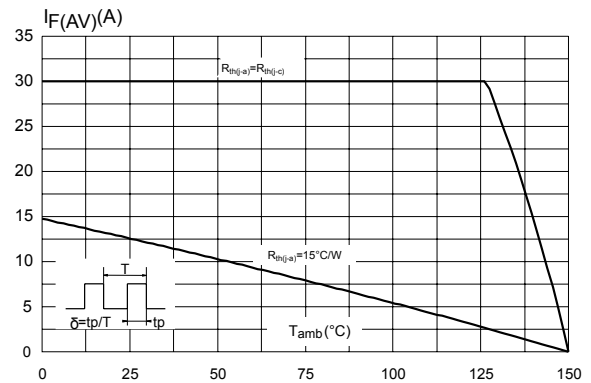
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

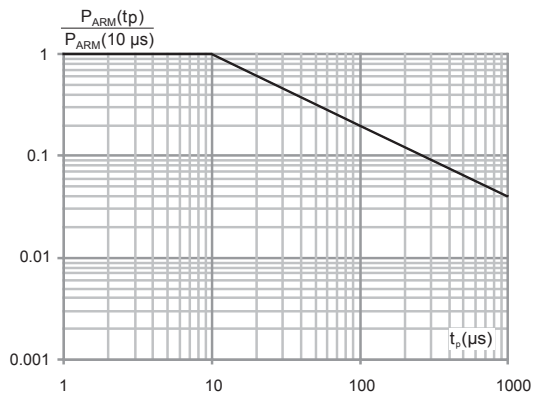
**Figure 1.** Average forward power dissipation versus average forward current (terminals 1 and 3 short circuited)



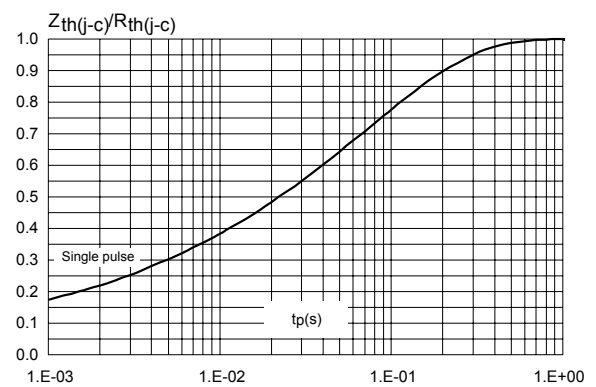
**Figure 2.** Average forward current versus ambient temperature ( $\delta = 0.5$ , terminals 1 and 3 short circuited)



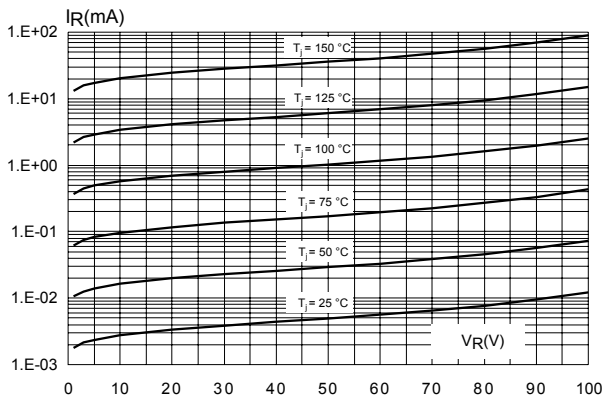
**Figure 3.** Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )



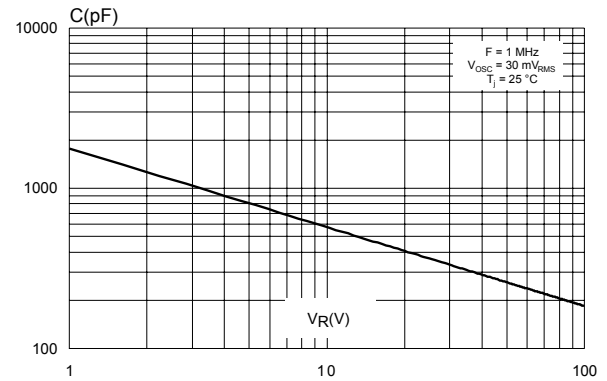
**Figure 4.** Relative variation of thermal impedance junction to case versus pulse duration



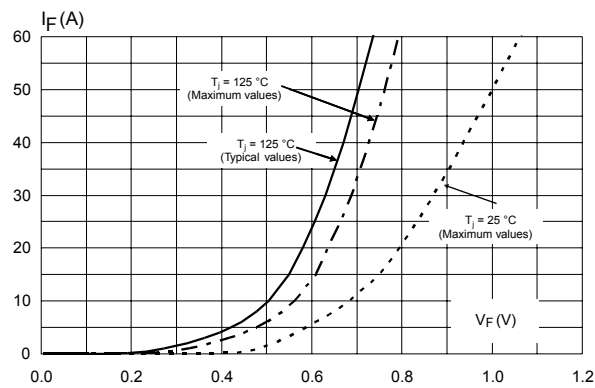
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values)**



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



**Figure 7. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)**



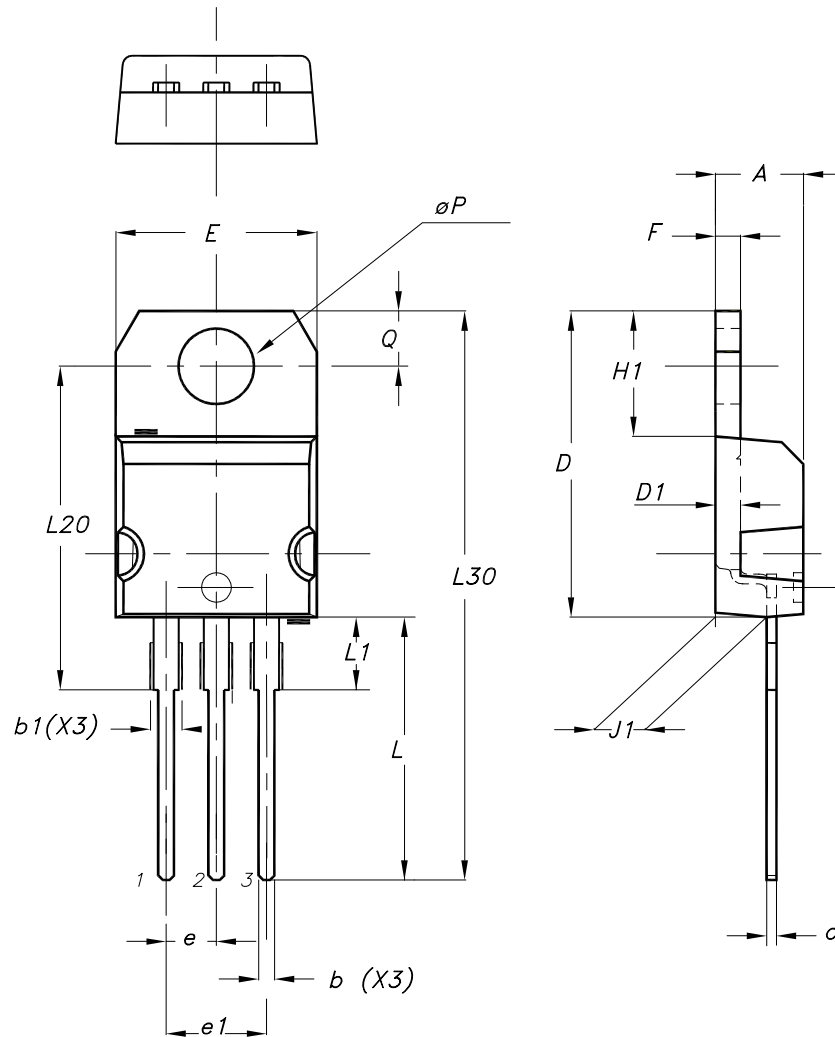
## 2 Package information

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 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 8. TO-220AB package outline**



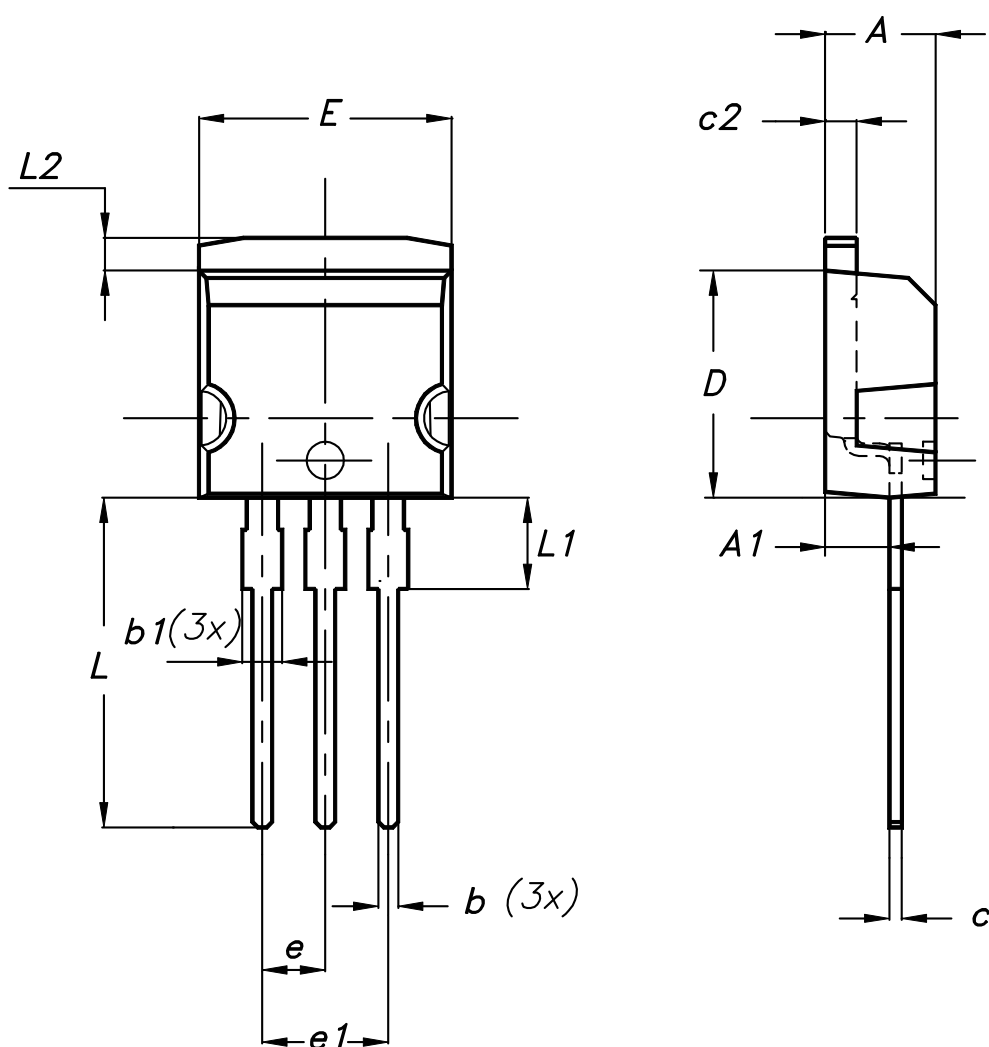
**Table 4. TO-220AB package mechanical data**

| Ref. | Dimensions  |       |                             |       |
|------|-------------|-------|-----------------------------|-------|
|      | Millimeters |       | Inches (for reference only) |       |
|      | Min.        | Max.  | Min.                        | Max.  |
| A    | 4.40        | 4.60  | 0.173                       | 0.181 |
| b    | 0.61        | 0.88  | 0.240                       | 0.035 |
| b1   | 1.14        | 1.55  | 0.045                       | 0.061 |
| c    | 0.48        | 0.70  | 0.019                       | 0.028 |
| D    | 15.25       | 15.75 | 0.600                       | 0.620 |
| D1   | 1.27 typ.   |       | 0.050 typ.                  |       |
| E    | 10.00       | 10.40 | 0.394                       | 0.409 |
| e    | 2.40        | 2.70  | 0.094                       | 0.106 |
| e1   | 4.95        | 5.15  | 0.195                       | 0.203 |
| F    | 1.23        | 1.32  | 0.048                       | 0.052 |
| H1   | 6.20        | 6.60  | 0.244                       | 0.260 |
| J1   | 2.40        | 2.72  | 0.094                       | 0.107 |
| L    | 13.00       | 14.00 | 0.512                       | 0.551 |
| L1   | 3.50        | 3.93  | 0.138                       | 0.155 |
| L20  | 16.40 typ.  |       | 0.646 typ.                  |       |
| L30  | 28.90 typ.  |       | 1.138 typ.                  |       |
| θP   | 3.75        | 3.85  | 0.148                       | 0.152 |
| Q    | 2.65        | 2.95  | 0.104                       | 0.116 |

## 2.2 I<sup>2</sup>PAK package information

- Epoxy meets UL 94, V0
- Cooling method: by conduction (C)

Figure 9. I<sup>2</sup>PAK package outline

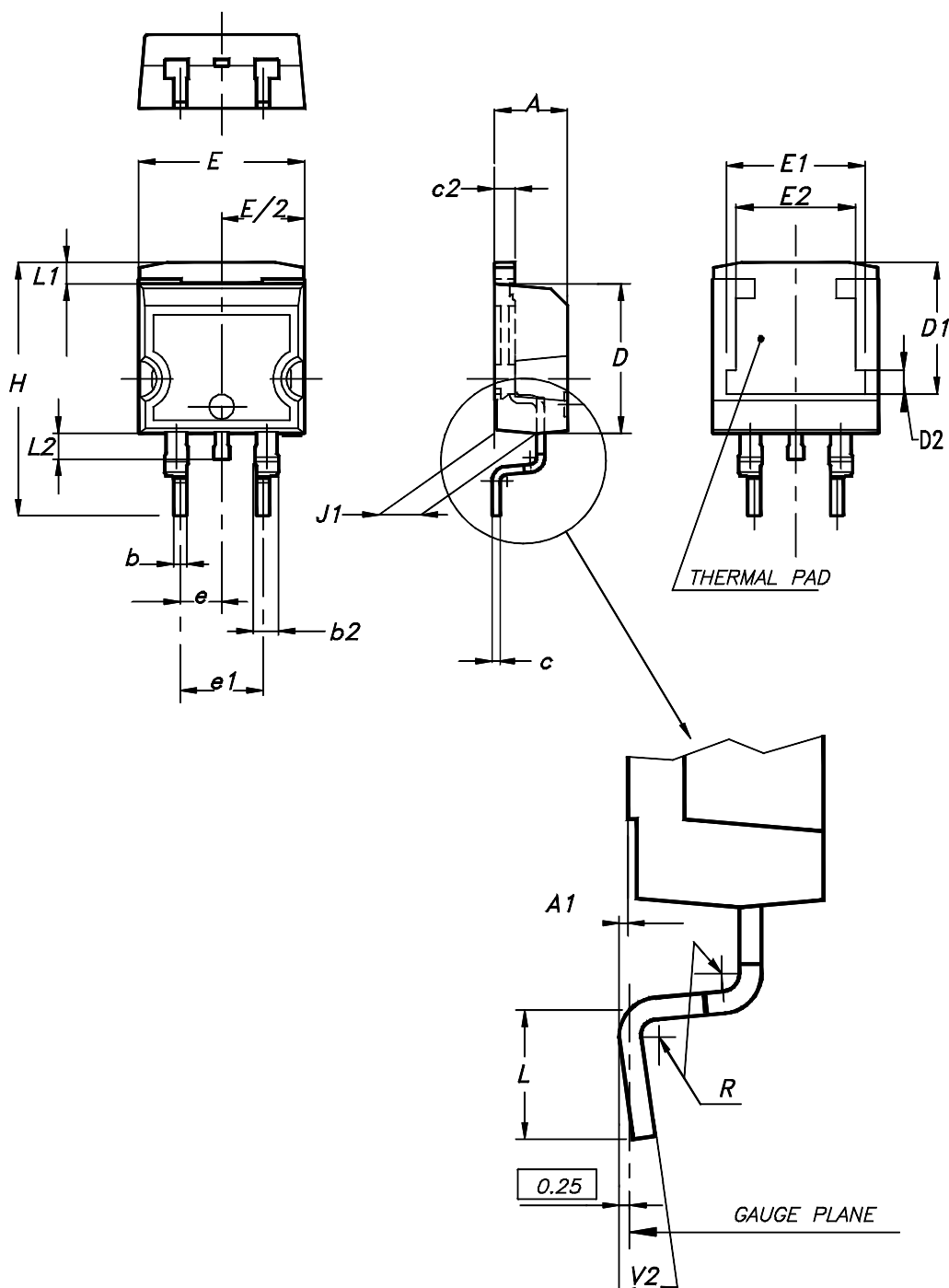


**Table 5.** I<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |       |                             |       |
|------|-------------|-------|-----------------------------|-------|
|      | Millimeters |       | Inches (for reference only) |       |
|      | Min.        | Max.  | Min.                        | Max.  |
| A    | 4.40        | 4.60  | 0.173                       | 0.181 |
| A1   | 2.40        | 2.72  | 0.094                       | 0.107 |
| b    | 0.61        | 0.88  | 0.024                       | 0.035 |
| b1   | 1.14        | 1.70  | 0.044                       | 0.067 |
| c    | 0.49        | 0.70  | 0.019                       | 0.028 |
| c2   | 1.23        | 1.32  | 0.048                       | 0.052 |
| D    | 8.95        | 9.35  | 0.352                       | 0.368 |
| e    | 2.40        | 2.70  | 0.094                       | 0.106 |
| e1   | 4.95        | 5.15  | 0.195                       | 0.203 |
| E    | 10.00       | 10.40 | 0.394                       | 0.409 |
| L    | 13.00       | 14.00 | 0.512                       | 0.551 |
| L1   | 3.50        | 3.93  | 0.138                       | 0.155 |
| L2   | 1.27        | 1.40  | 0.050                       | 0.055 |

## 2.3 D<sup>2</sup>PAK package information

Figure 10. D<sup>2</sup>PAK package outline

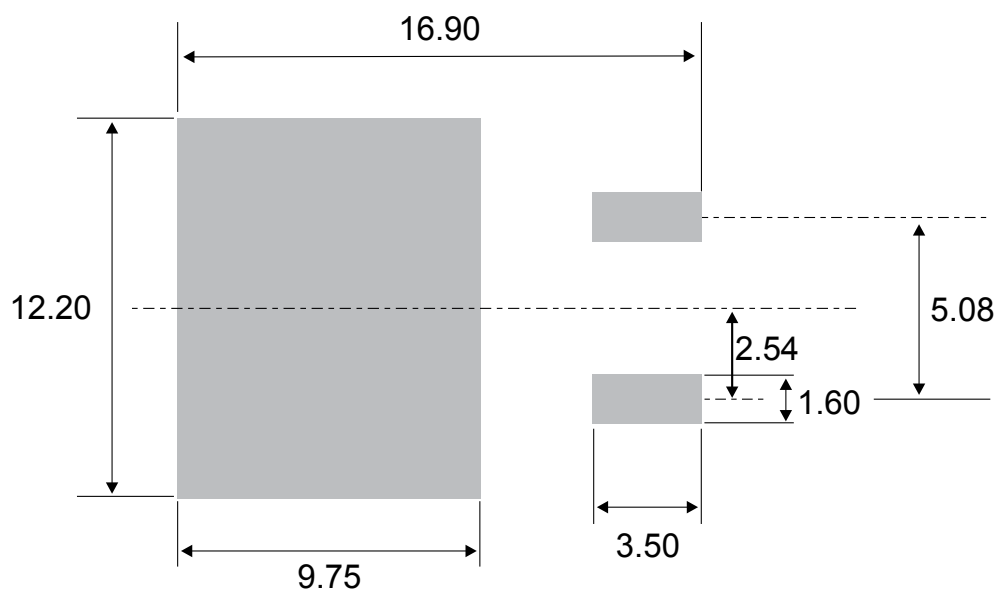


**Note:** This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

**Table 6. D<sup>2</sup>PAK package mechanical data**

| Ref. | Dimensions  |       |                             |       |
|------|-------------|-------|-----------------------------|-------|
|      | Millimeters |       | Inches (for reference only) |       |
|      | Min.        | Max.  | Min.                        | Max.  |
| A    | 4.36        | 4.60  | 0.172                       | 0.181 |
| A1   | 0.00        | 0.25  | 0.000                       | 0.010 |
| b    | 0.70        | 0.93  | 0.028                       | 0.037 |
| b2   | 1.14        | 1.70  | 0.045                       | 0.067 |
| c    | 0.38        | 0.69  | 0.015                       | 0.027 |
| c2   | 1.19        | 1.36  | 0.047                       | 0.053 |
| D    | 8.60        | 9.35  | 0.339                       | 0.368 |
| D1   | 6.90        | 8.00  | 0.272                       | 0.311 |
| D2   | 1.10        | 1.50  | 0.043                       | 0.060 |
| E    | 10.00       | 10.55 | 0.394                       | 0.415 |
| E1   | 8.10        | 8.90  | 0.319                       | 0.346 |
| E2   | 6.85        | 7.25  | 0.266                       | 0.282 |
| e    | 2.54 typ.   |       | 0.100                       |       |
| e1   | 4.88        | 5.28  | 0.190                       | 0.205 |
| H    | 15.00       | 15.85 | 0.591                       | 0.624 |
| J1   | 2.49        | 2.90  | 0.097                       | 0.112 |
| L    | 1.90        | 2.79  | 0.075                       | 0.110 |
| L1   | 1.27        | 1.65  | 0.049                       | 0.065 |
| L2   | 1.30        | 1.78  | 0.050                       | 0.070 |
| R    | 0.4 typ.    |       | 0.015                       |       |
| V2   | 0°          | 8°    | 0°                          | 8°    |

**Figure 11. D<sup>2</sup>PAK recommended footprint (dimensions in mm)**



### 3 Ordering information

**Table 7. Ordering information**

| Order code       | Marking     | Package            | Weight | Base qty. | Delivery mode |
|------------------|-------------|--------------------|--------|-----------|---------------|
| STPS30SM100ST    | PS30SM100ST | TO-220AB           | 1.95 g | 50        | Tube          |
| STPS30SM100SR    | PS30SM100SR | I <sup>2</sup> PAK | 1.50 g | 50        | Tube          |
| STPS30SM100SG-TR | PS30SM100SG | D <sup>2</sup> PAK | 1.48 g | 1000      | Tape and reel |

## Revision history

**Table 8. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                                                                                                                           |
|-------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25-Mar-2009 | 1        | First issue.                                                                                                                                                                                                                                                                      |
| 16-Apr-2010 | 2        | Updated package graphic for TO-220AB on front page and in <i>Table 5</i> .                                                                                                                                                                                                        |
| 28-Jan-2011 | 3        | Added warning paragraph above <i>Table 8</i> .                                                                                                                                                                                                                                    |
| 15-Sep-2011 | 4        | Added TO-220AB narrow leads package.                                                                                                                                                                                                                                              |
| 12-May-2017 | 5        | Removed TO-220FPAB package. Updated D <sup>2</sup> PAK section.                                                                                                                                                                                                                   |
| 05-Oct-2018 | 6        | Updated cover page and <a href="#">Table 1</a> . Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified).<br>Removed figure 1, figure 9 and TO-220AB narrow leads package.<br>Minor text changes to improve readability. |
| 18-Feb-2019 | 7        | Updated <a href="#">Table 1</a> .                                                                                                                                                                                                                                                 |

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