

### Features

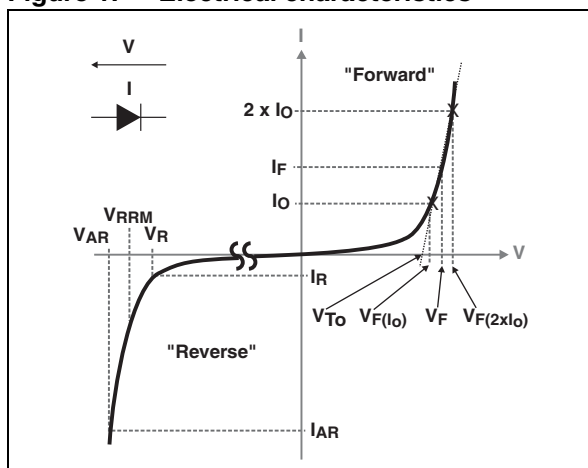
- High current capability
- Avalanche rated
- Low forward voltage drop current
- High frequency operation
- Insulated package:
  - Insulation voltage 2000 V rms
  - Package capacitance = 12 pF

### Description

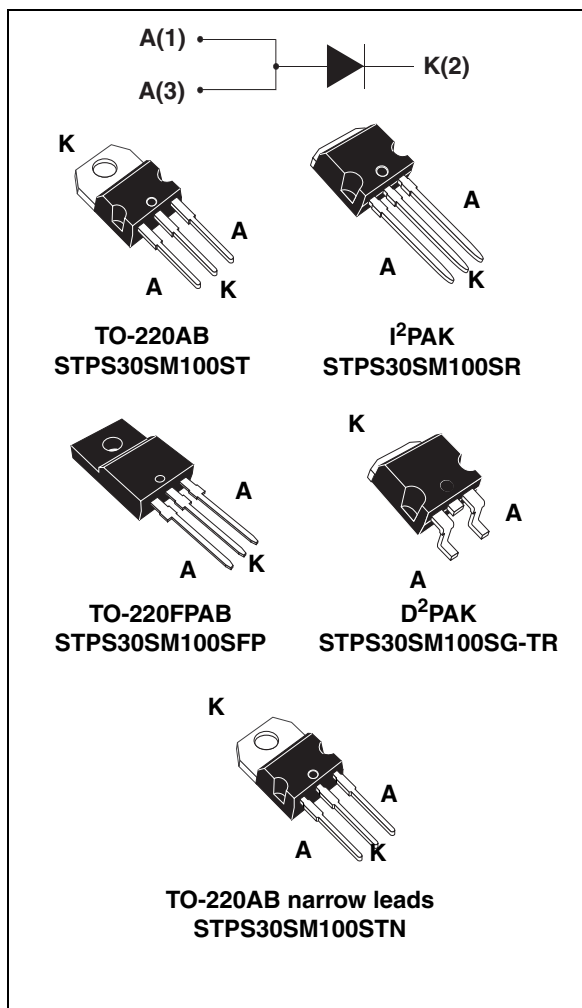
This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB, TO-220AB narrow leads, TO-220FPAB, D<sup>2</sup>PAK and I<sup>2</sup>PAK, this device is intended to be used in notebook, game station and desktop adaptors, providing in these applications a good efficiency at both low and high load.

**Figure 1. Electrical characteristics (a)**



- a.  $V_{ARM}$  and  $I_{ARM}$  must respect the reverse safe operating area defined in [Figure 13](#).  $V_{AR}$  and  $I_{AR}$  are pulse measurements ( $t_p < 1 \mu s$ ).  $V_R$ ,  $I_R$ ,  $V_{RRM}$  and  $V_F$  are static characteristics



**Table 1. Device summary**

|             |         |
|-------------|---------|
| $I_{F(AV)}$ | 30 A    |
| $V_{RRM}$   | 100 V   |
| $T_j$ (max) | 150 °C  |
| $V_F$ (typ) | 0.420 V |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values with terminals 1 and 3 short circuited)**

| Symbol                          | Parameter   |  | Value        | Unit |
|---------------------------------|---|--|--------------|------|
| V <sub>RRM</sub>                | Repetitive peak reverse voltage                       |  | 100          | V    |
| I <sub>F(RMS)</sub>             | Forward current rms                                   |  | 60           | A    |
| I <sub>F(AV)</sub>              | Average forward current $\delta = 0.5$                | TO-220AB, TO-220AB narrow leads, D <sup>2</sup> PAK, I <sup>2</sup> PAK, T <sub>c</sub> = 125 °C | 30           | A    |
|                                 |   | TO-220FPAB, T <sub>c</sub> = 80 °C   |              |      |
| I <sub>FSM</sub>                | Surge non repetitive forward current                  | t <sub>p</sub> = 10 ms sinusoidal, terminals 1 and 3 short circuited                             | 530          | A    |
| P <sub>ARM</sub> <sup>(1)</sup> | Repetitive peak avalanche power                       | t <sub>p</sub> = 1 $\mu$ s T <sub>j</sub> = 25 °C  | 21500        | W    |
| V <sub>ARM</sub> <sup>(2)</sup> | Maximum repetitive peak avalanche voltage             | t <sub>p</sub> < 1 $\mu$ s T <sub>j</sub> < 150 °C<br>I <sub>AR</sub> < 53.8 A                   | 120          | V    |
| V <sub>ASM</sub> <sup>(2)</sup> | Maximum single pulse peak avalanche voltage           | t <sub>p</sub> < 1 $\mu$ s T <sub>j</sub> < 150 °C<br>I <sub>AR</sub> < 53.8 A                   | 120          | V    |
| T <sub>stg</sub>                | Storage temperature range                             |  | -65 to + 175 | °C   |
| T <sub>j</sub>                  | Maximum operating junction temperature <sup>(3)</sup> |  | 150          | °C   |

1. For temperature or pulse time duration deratings, refer to [Figure 4](#), and [Figure 5](#).. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
2. Refer to [Figure 13](#).
3.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

**Table 3. Thermal resistance**

| Symbol               | Parameter        |   | Value | Unit |
|----------------------|------------------|---|-------|------|
| R <sub>th(j-c)</sub> | Junction to case | TO-220AB, TO-220AB narrow leads, D <sup>2</sup> PAK, I <sup>2</sup> PAK | 1     | °C/W |
|                      |                  | TO-220FPAB  | 4     |      |

**Table 4. Static electrical characteristics (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> = 10A              |      | 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:  
 $P = 0.580 \times I_{F(AV)} + 0.0033 \times I_{F(RMS)}^2$

Figure 2. Average forward power dissipation versus average forward current

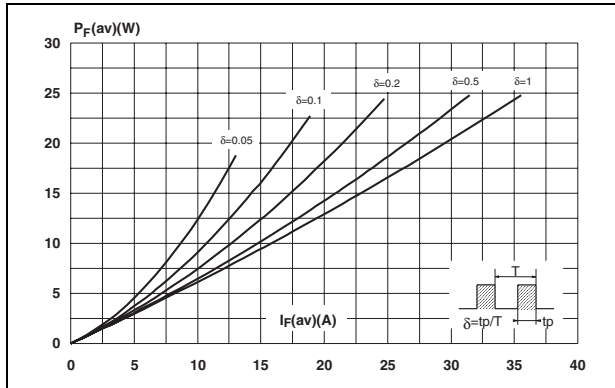


Figure 3. Average forward current versus ambient temperature (delta = 0.5)

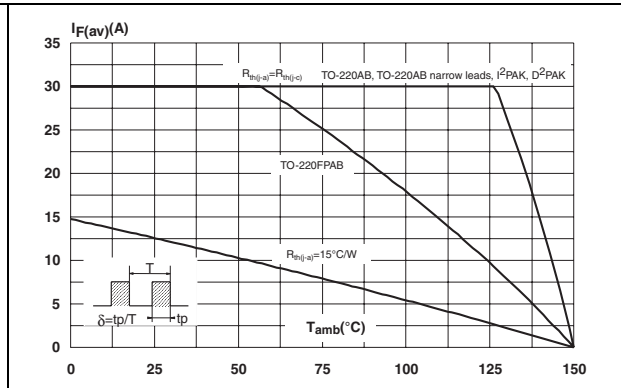


Figure 4. Normalized avalanche power derating versus pulse duration

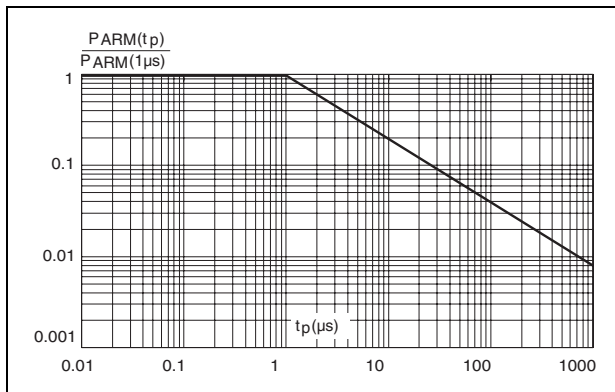


Figure 5. Normalized avalanche power derating versus junction temperature

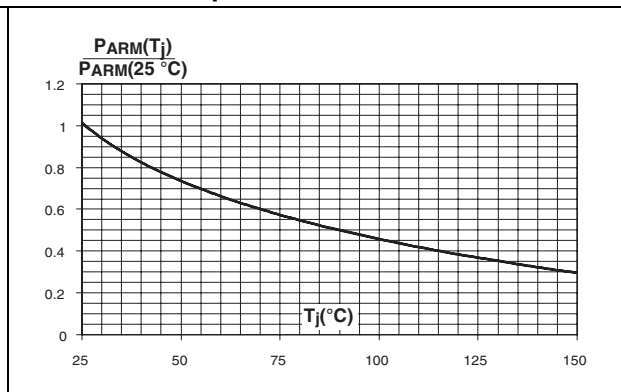


Figure 6. Non repetitive surge peak forward current versus overload duration, maximum values

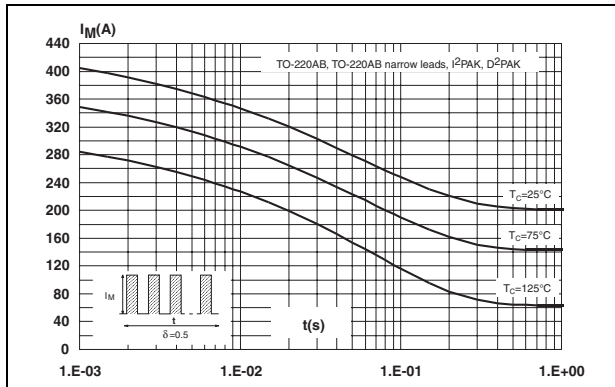
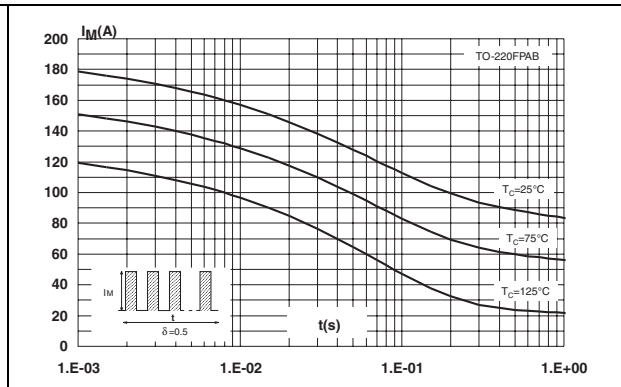
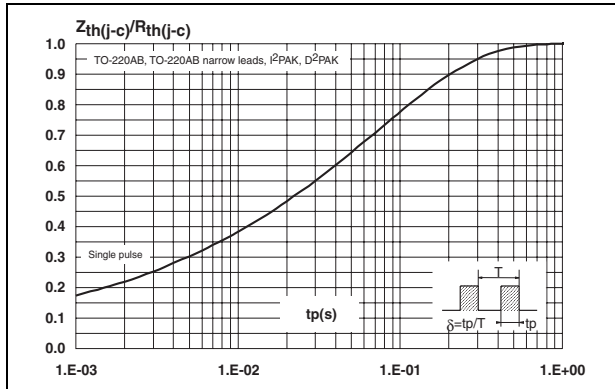


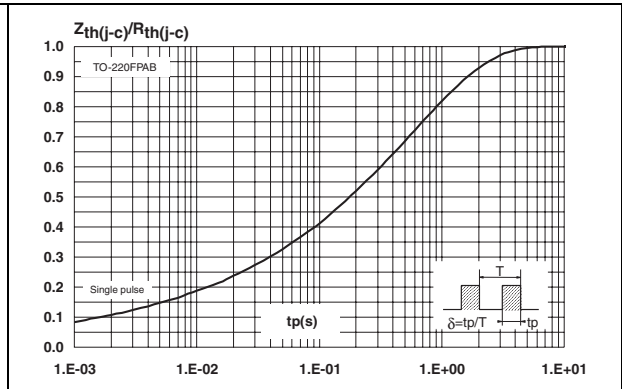
Figure 7. Non repetitive surge peak forward current versus overload duration, maximum values (TO-220FPAB)



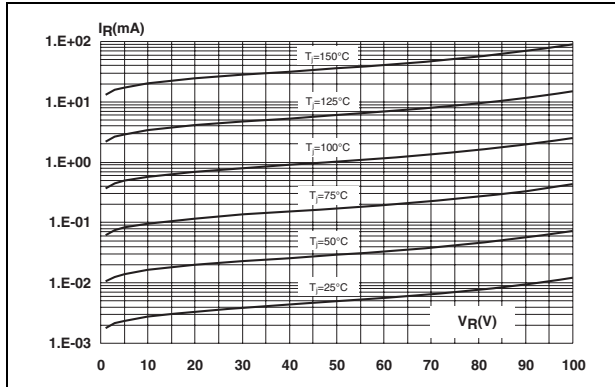
**Figure 8. Relative variation of thermal impedance junction to case versus pulse duration**



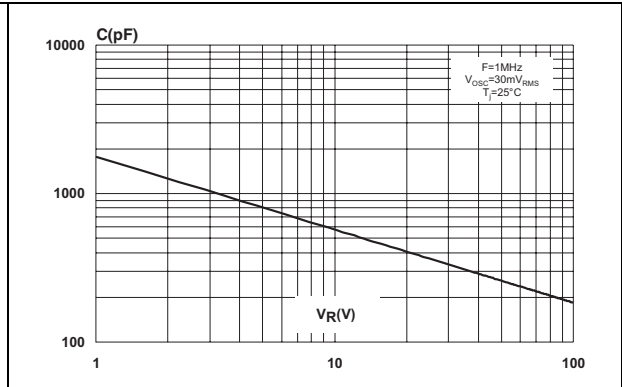
**Figure 9. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**



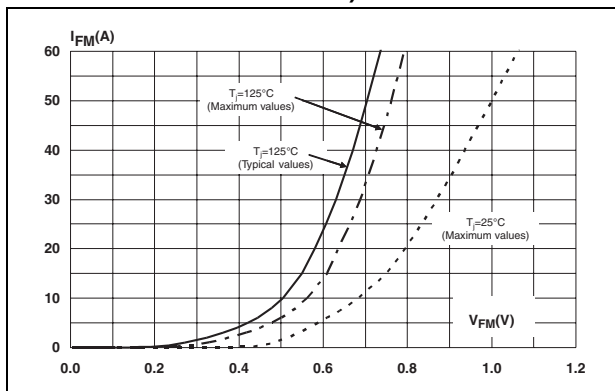
**Figure 10. Reverse leakage current versus reverse voltage applied (typical values)**



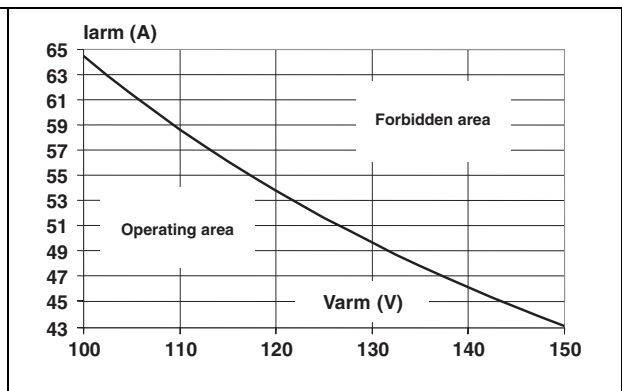
**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 12. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)**



**Figure 13. Reverse safe operating area ( $t_p < 1 \mu\text{s}$  and  $T_j < 150^\circ\text{C}$ )**



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

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.

**Table 5. TO-220AB dimensions**

| Ref.  | Dimensions  |       |            |       |
|-------|-------------|-------|------------|-------|
|       | Millimeters |       | Inches     |       |
|       | Min.        | Max.  | Min.       | Max.  |
| A     | 4.40        | 4.60  | 0.173      | 0.181 |
| C     | 1.23        | 1.32  | 0.048      | 0.051 |
| D     | 2.40        | 2.72  | 0.094      | 0.107 |
| E     | 0.49        | 0.70  | 0.019      | 0.027 |
| F     | 0.61        | 0.88  | 0.024      | 0.034 |
| F1    | 1.14        | 1.70  | 0.044      | 0.066 |
| F2    | 1.14        | 1.70  | 0.044      | 0.066 |
| G     | 4.95        | 5.15  | 0.194      | 0.202 |
| G1    | 2.40        | 2.70  | 0.094      | 0.106 |
| H2    | 10          | 10.40 | 0.393      | 0.409 |
| L2    | 16.4 typ.   |       | 0.645 typ. |       |
| L4    | 13          | 14    | 0.511      | 0.551 |
| L5    | 2.65        | 2.95  | 0.104      | 0.116 |
| L6    | 15.25       | 15.75 | 0.600      | 0.620 |
| L7    | 6.20        | 6.60  | 0.244      | 0.259 |
| L9    | 3.50        | 3.93  | 0.137      | 0.154 |
| M     | 2.6 typ.    |       | 0.102 typ. |       |
| Diam. | 3.75        | 3.85  | 0.147      | 0.151 |

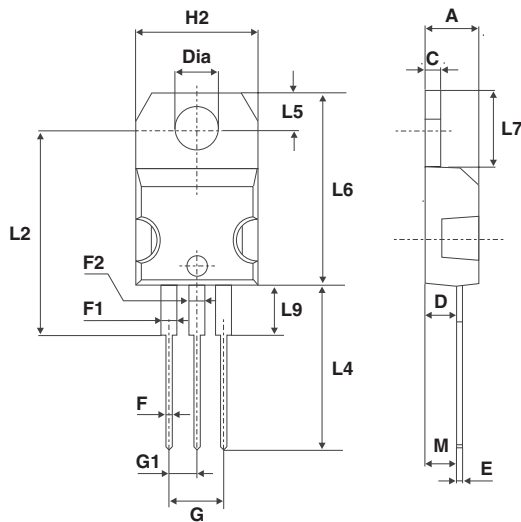


Table 6. TO-220AB narrow leads dimensions

| Ref. | Dimensions  |      |       |        |      |       |
|------|-------------|------|-------|--------|------|-------|
|      | Millimeters |      |       | Inches |      |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ. | Max.  |
| A    | 4.40        |      | 4.60  | 0.17   |      | 0.18  |
| b    | 0.61        |      | 0.88  | 0.024  |      | 0.034 |
| b1   | 0.95        |      | 1.20  | 0.037  |      | 0.047 |
| c    | 0.48        |      | 0.70  | 0.019  |      | 0.027 |
| D    | 15.25       |      | 15.75 | 0.60   |      | 0.62  |
| D1   | 1.27        |      |       | 0.05   |      |       |
| E    | 10.00       |      | 10.40 | 0.39   |      | 0.41  |
| e    | 2.40        |      | 2.70  | 0.094  |      | 0.106 |
| e1   | 4.95        |      | 5.15  | 0.19   |      | 0.20  |
| F    | 1.23        |      | 1.32  | 0.048  |      | 0.052 |
| H1   | 6.20        |      | 6.60  | 0.24   |      | 0.26  |
| J1   | 2.40        |      | 2.72  | 0.095  |      | 0.107 |
| L    | 13.00       |      | 14.00 | 0.51   |      | 0.55  |
| L1   | 2.60        |      | 2.90  | 0.102  |      | 0.114 |
| L20  | 15.40       |      |       | 0.61   |      |       |
| L30  | 28.90       |      |       | 1.14   |      |       |
| ØP   | 3.75        |      | 3.85  | 0.147  |      | 0.151 |
| Q    | 2.65        |      | 2.95  | 0.104  |      | 0.116 |

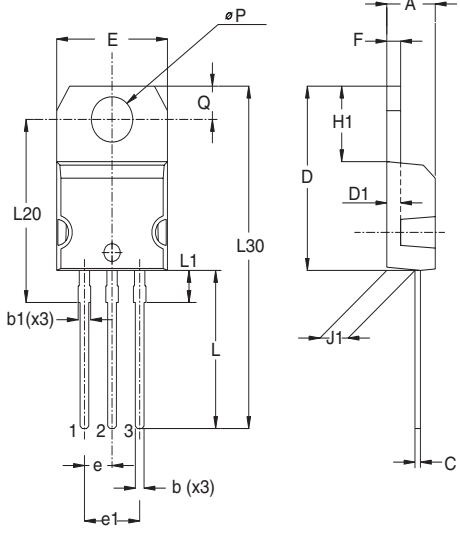
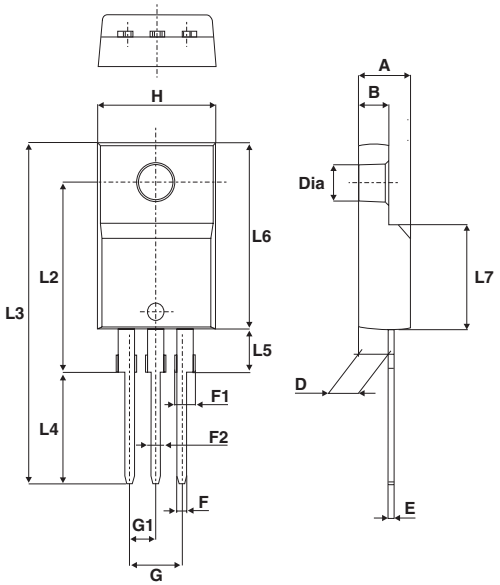


Table 7. TO-220FPAB dimensions



| Ref. | Dimensions  |      |           |       |
|------|-------------|------|-----------|-------|
|      | Millimeters |      | Inches    |       |
|      | Min.        | Max. | Min.      | Max.  |
| A    | 4.4         | 4.6  | 0.173     | 0.181 |
| B    | 2.5         | 2.7  | 0.098     | 0.106 |
| D    | 2.5         | 2.75 | 0.098     | 0.108 |
| E    | 0.45        | 0.70 | 0.018     | 0.027 |
| F    | 0.75        | 1    | 0.030     | 0.039 |
| F1   | 1.15        | 1.70 | 0.045     | 0.067 |
| F2   | 1.15        | 1.70 | 0.045     | 0.067 |
| G    | 4.95        | 5.20 | 0.195     | 0.205 |
| G1   | 2.4         | 2.7  | 0.094     | 0.106 |
| H    | 10          | 10.4 | 0.393     | 0.409 |
| L2   | 16 Typ.     |      | 0.63 Typ. |       |
| L3   | 28.6        | 30.6 | 1.126     | 1.205 |
| L4   | 9.8         | 10.6 | 0.386     | 0.417 |
| L5   | 2.9         | 3.6  | 0.114     | 0.142 |
| L6   | 15.9        | 16.4 | 0.626     | 0.646 |
| L7   | 9.00        | 9.30 | 0.354     | 0.366 |
| Dia. | 3.00        | 3.20 | 0.118     | 0.126 |

Devices in I<sup>2</sup>PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

**Table 8. I<sup>2</sup>PAK dimensions**

| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | 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          | 10.40 | 0.394  | 0.409 |
| L    | 13          | 14    | 0.512  | 0.551 |
| L1   | 3.50        | 3.93  | 0.138  | 0.155 |
| L2   | 1.27        | 1.40  | 0.050  | 0.055 |

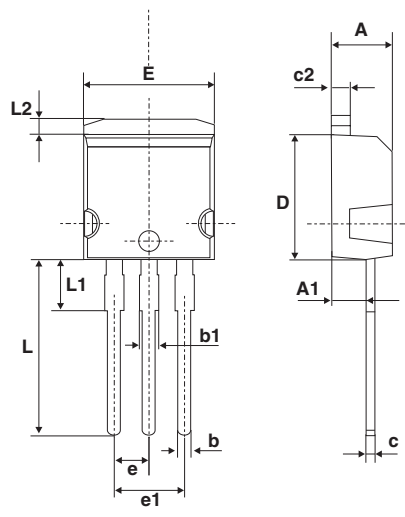
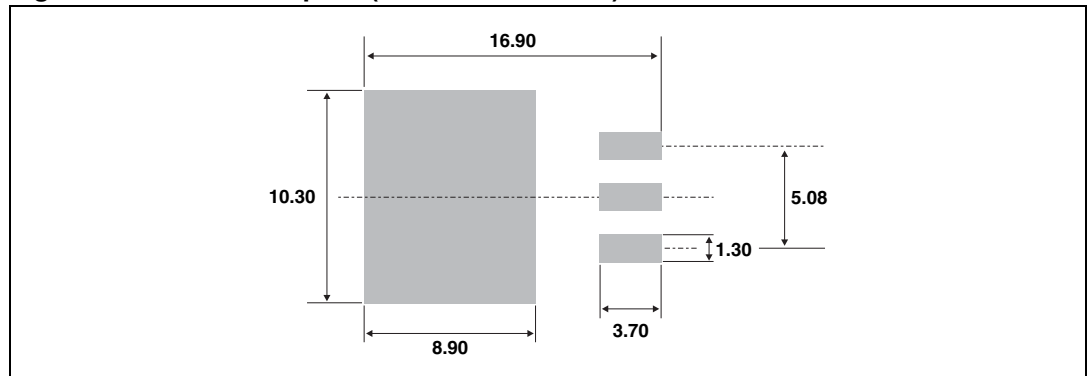




Table 9. D<sup>2</sup>PAK dimensions

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 4.40        | 4.60  | 0.173      | 0.181 |
| A1   | 2.49        | 2.69  | 0.098      | 0.106 |
| A2   | 0.03        | 0.23  | 0.001      | 0.009 |
| B    | 0.70        | 0.93  | 0.027      | 0.037 |
| B2   | 1.14        | 1.70  | 0.045      | 0.067 |
| C    | 0.45        | 0.60  | 0.017      | 0.024 |
| C2   | 1.23        | 1.36  | 0.048      | 0.054 |
| D    | 8.95        | 9.35  | 0.352      | 0.368 |
| E    | 10.00       | 10.40 | 0.393      | 0.409 |
| G    | 4.88        | 5.28  | 0.192      | 0.208 |
| L    | 15.00       | 15.85 | 0.590      | 0.624 |
| L2   | 1.27        | 1.40  | 0.050      | 0.055 |
| L3   | 1.40        | 1.75  | 0.055      | 0.069 |
| M    | 2.40        | 3.20  | 0.094      | 0.126 |
| R    | 0.40 typ.   |       | 0.016 typ. |       |
| V2   | 0°          | 8°    | 0°         | 8°    |

Figure 14. D<sup>2</sup>PAK footprint (dimensions in mm)



### 3 Ordering information

**Table 10. Ordering information**

| Order code       | Marking      | Package                  | Weight | Base qty | Delivery mode |
|------------------|--------------|--------------------------|--------|----------|---------------|
| STPS30SM100ST    | PS30SM100ST  | TO-220AB                 | 2.2 g  | 50       | Tube          |
| STPS30SM100SFP   | PS30SM100SFP | TO-220FPAB               | 1.70 g | 50       | Tube          |
| STPS30SM100SR    | PS30SM100SR  | I <sup>2</sup> PAK       | 1.49 g | 50       | Tube          |
| STPS30SM100SG-TR | PS30SM100SG  | D <sup>2</sup> PAK       | 1.48 g | 1000     | Tape and reel |
| STPS30SM100STN   | PS30SM100STN | TO-220AB<br>narrow leads | 1.9 g  | 50       | Tube          |

### 4 Revision history

**Table 11. 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 <a href="#">Table 5</a> . |
| 28-Jan-2011 | 3        | Added warning paragraph above <a href="#">Table 8</a> .                             |
| 15-Sep-2011 | 4        | Added TO-220AB narrow leads package.  |

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