# STPS30M100S



## 100 V, 30 A power Schottky rectifier

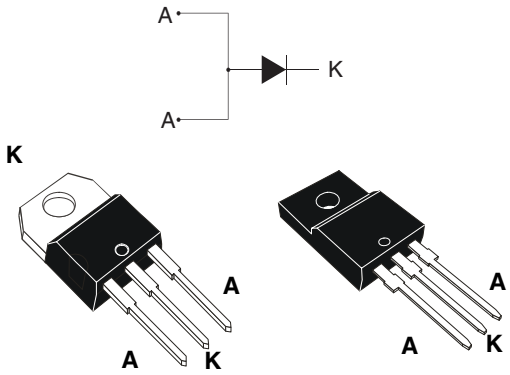
## Features

- Avalanche rated
- Low $V_F$
- Good trade off between leakage current and forward voltage drop
- High frequency operation
- Avalanche capability specified

## Description

Single Schottky rectifier, suited for high frequency switch mode power supply.

Packaged in TO-220AB,TO-220FPAB, and $I^2PAK$ this device is intended to be used in notebook and game station adaptors, providing in these applications a good efficiency at both low and high load.




**TO-220AB**
**STPS30M100ST**

**TO-220FPAB**
**STPS30M100SFP**

**$I^2PAK$**
**STPS30M100SR**

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

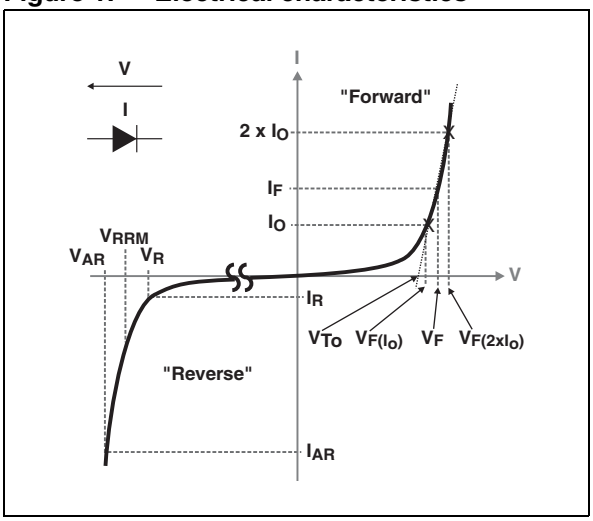



**Table 1. Device summary**

| | |
|---|---|
| $I_{F(AV)}$ | 30 A |
| $V_{RRM}$ | 100 V |
| $T_j$ (max) | 150° C |
| $V_F$(typ) | 0.385 V |

a. $V_{ARM}$ and $I_{ARM}$ must respect the reverse safe operating area defined in *Figure 14.* $V_{AR}$ and $I_{AR}$ are pulse measurements ($t_p$ < 1 µs). $V_R$, $I_R$, $V_{RRM}$ and $V_F$, are static characteristics

# 1 Characteristics



**Table 2. Absolute ratings (limiting values)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | 100 | V |
| $I_{F(RMS)}$ | Forward rms current | | 60 | A |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ | $T_c = 125$ °C | 30 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p = 10$ ms sinusoidal | 300 | A |
| $P_{ARM}$ | Repetitive peak avalanche power | $t_p = 1$ µs $T_j = 25$° C | 26400 | W |
| $V_{ARM}$ (1) | Maximum repetitive peak avalanche voltage | $t_p < 1$ µs $T_j < 150$ °C $I_{AR} < 66$ A | 120 | V |
| $V_{ASM}$ (1) | Maximum single pulse peak avalanche voltage | $t_p < 1$ µs $T_j < 150$ °C $I_{AR} < 66$ A | 120 | V |
| $T_{stg}$ | Storage temperature range | | -65 to + 175 | °C |
| $T_j$ | Maximum operating junction temperature (2) | | 150 | °C |

1. Refer to *Figure 14.*
2. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

**Table 3. Thermal resistance**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | TO-220AB, $I^2PAK$ | | 1 | °C/W |
| | | TO-220FPAB | Per diode | 4 | |

**Table 4. Static electrical characteristics with all leads connected on board**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$(1) | Reverse leakage current | $T_j = 25$° C | $V_R = V_{RRM}$ | | | 175 | µA |
| | | $T_j = 125$° C | | | 20 | 50 | mA |
| | | $T_j = 25$° C | $V_R = 70$ V | | | 60 | µA |
| | | $T_j = 125$° C | | | 10 | 20 | mA |
| $V_F$(2) | Forward voltage drop | $T_j = 25$° C | $I_F = 5$ A | | 0.475 | | V |
| | | $T_j = 125$° C | | | 0.385 | | |
| | | $T_j = 25$° C | $I_F = 10$ A | | 0.555 | | |
| | | $T_j = 125$° C | | | 0.475 | | |
| | | $T_j = 25$° C | $I_F = 15$ A | | 0.620 | 0.660 | |
| | | $T_j = 125$° C | | | 0.525 | 0.565 | |
| | | $T_j = 25$° C | $I_F = 30$ A | | 0.740 | 0.800 | |
| | | $T_j = 125$° C | | | 0.605 | 0.655 | |

1. Pulse test: $t_p = 5$ ms, $\delta < 2\%$
2. Pulse test: $t_p = 380$ µs, $\delta < 2\%$

To evaluate the conduction losses use the following equation:
$P = 0.475 \times I_{F(AV)} + 0.006 \times I_{F}^{2}{}_{(RMS)}$



**Figure 2. Conduction losses versus average current**

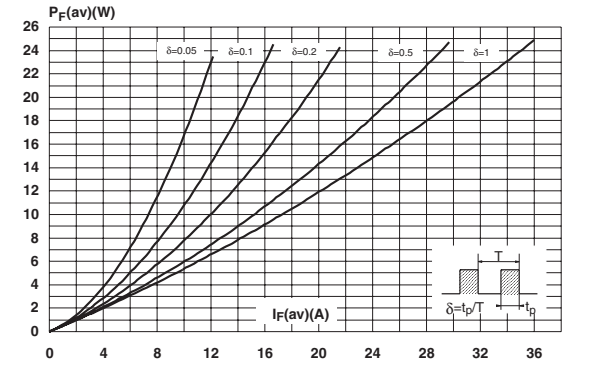



**Figure 3. Average forward current versus ambient temperature (δ = 0.5)**

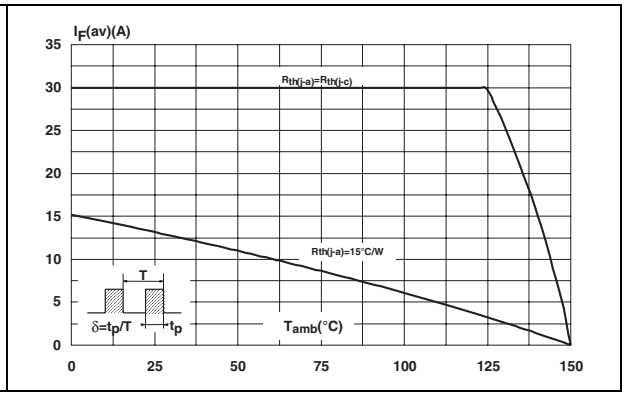



**Figure 4. Normalized avalanche power derating versus pulse duration**

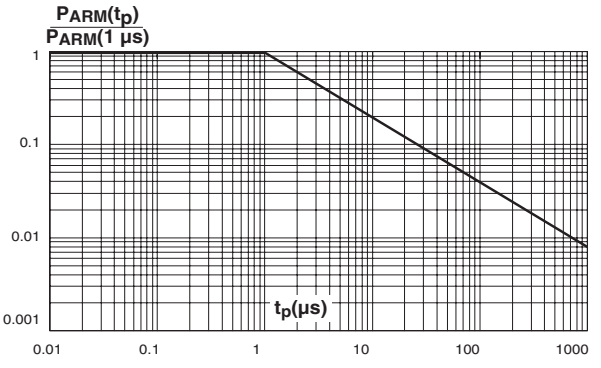



**Figure 5. Normalized avalanche power derating versus junction temperature**

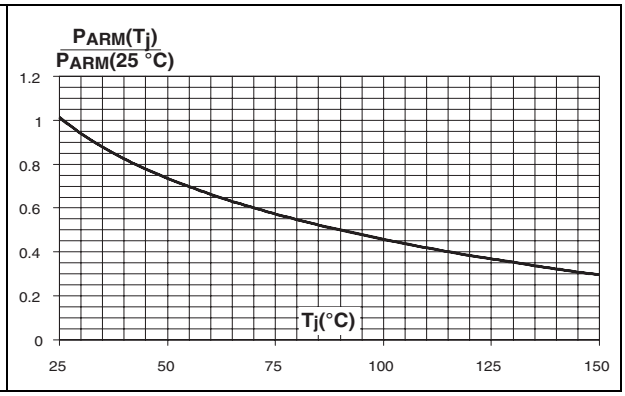



**Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values)**

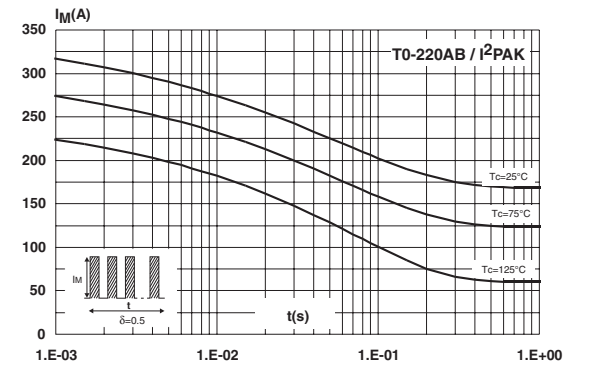



**Figure 7. Relative variation of thermal impedance junction to case versus pulse duration**

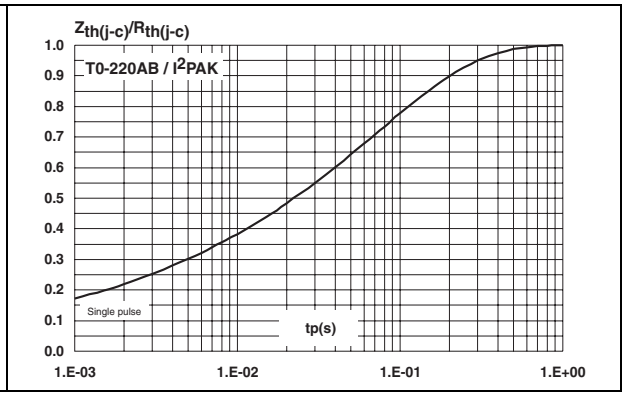


**Figure 8. Non repetitive surge peak forward current versus overload duration (maximum values) (TO-220FPAB)**

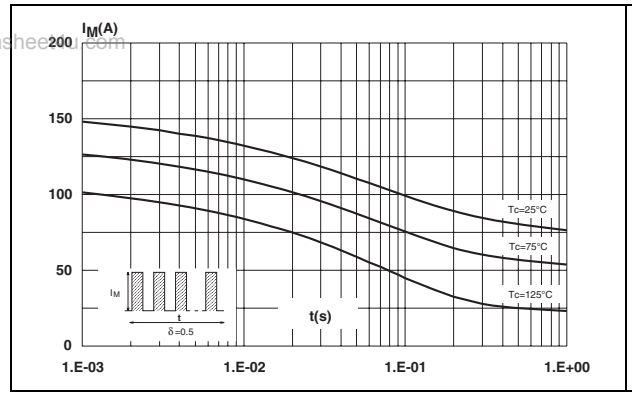



**Figure 9. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**

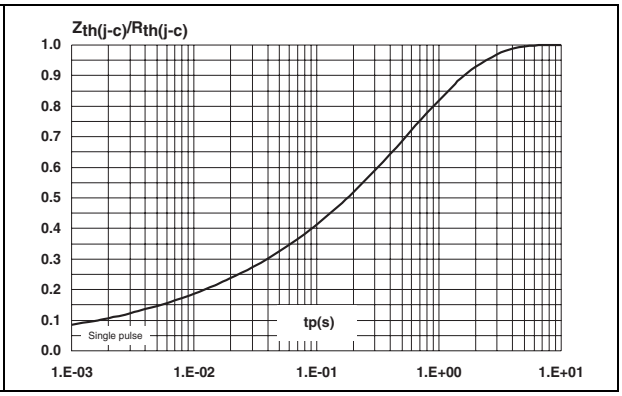



**Figure 10. Reverse leakage current versus reverse voltage applied (typical values)**

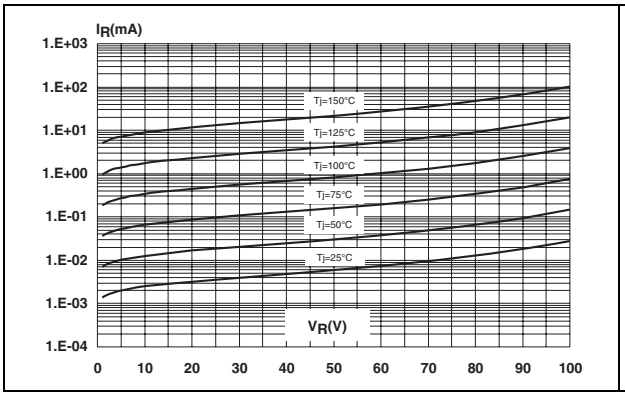



**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**

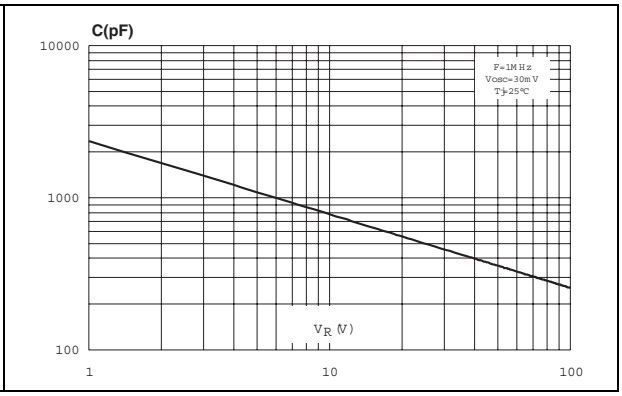



**Figure 12. Forward voltage drop versus forward current (high level)**

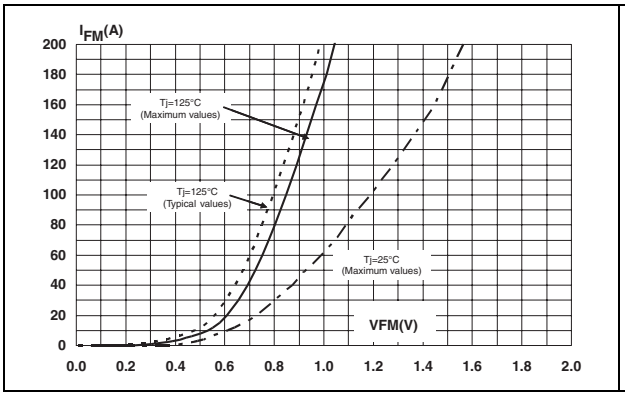



**Figure 13. Forward voltage drop versus forward current (low level)**

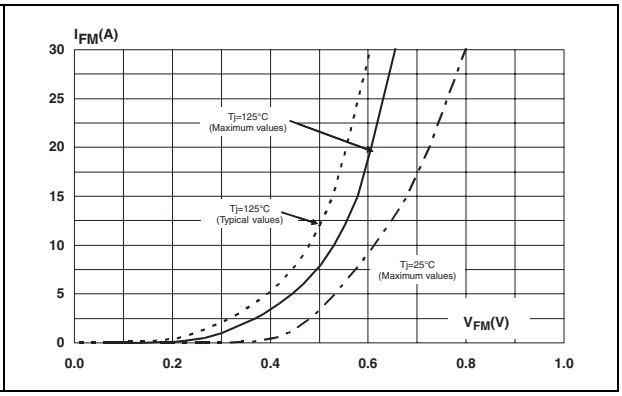
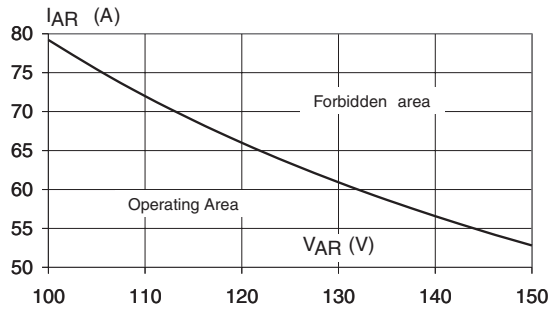


**Figure 14. Reverse safe operating area ($t_p$ < 1 µs and $T_j$ < 150 °C)**



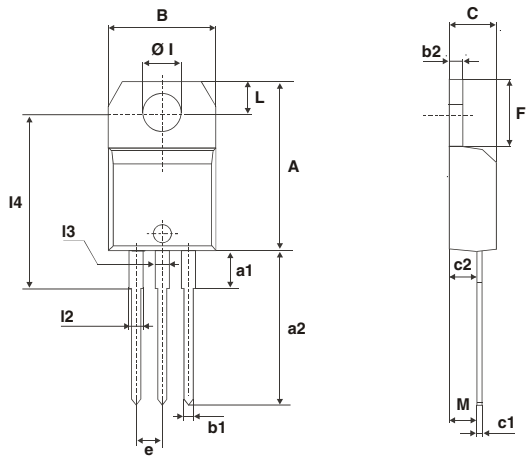
# 2 Package Information



- Epoxy meets UL94,V0
- Recommended torque: 0.4 to 0.6 N·m

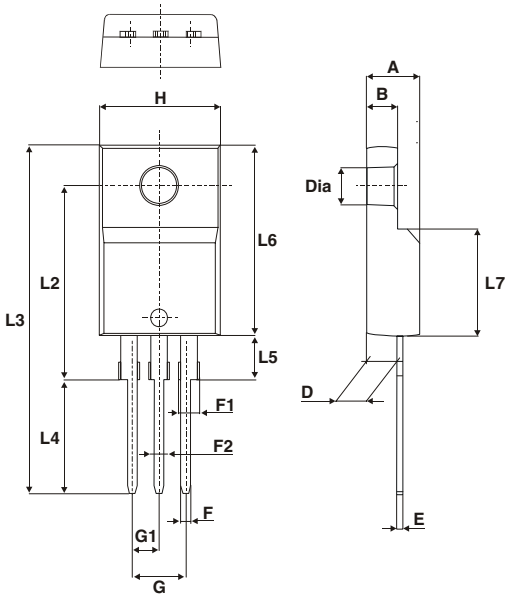
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

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



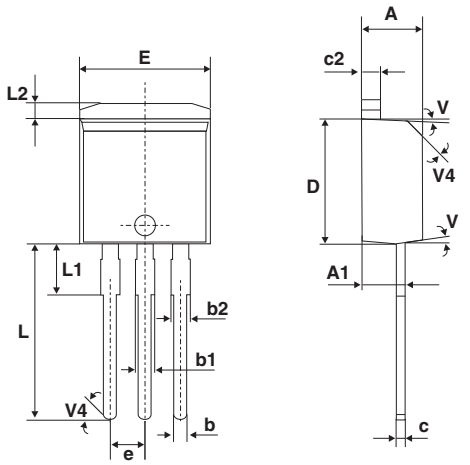

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 15.20 | | 15.90 | 0.598 | | 0.625 |
| a1 | | 3.75 | | | 0.147 | |
| a2 | 13.00 | | 14.00 | 0.511 | | 0.551 |
| B | 10.00 | | 10.40 | 0.393 | | 0.409 |
| b1 | 0.61 | | 0.88 | 0.024 | | 0.034 |
| b2 | 1.23 | | 1.32 | 0.048 | | 0.051 |
| C | 4.40 | | 4.60 | 0.173 | | 0.181 |
| c1 | 0.49 | | 0.70 | 0.019 | | 0.027 |
| c2 | 2.40 | | 2.72 | 0.094 | | 0.107 |
| e | 2.40 | | 2.70 | 0.094 | | 0.106 |
| F | 6.20 | | 6.60 | 0.244 | | 0.259 |
| ØI | 3.75 | | 3.85 | 0.147 | | 0.151 |
| l4 | 15.80 | 16.40 | 16.80 | 0.622 | 0.646 | 0.661 |
| L | 2.65 | | 2.95 | 0.104 | | 0.116 |
| l2 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| l3 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| M | | 2.60 | | | 0.102 | |

**Table 6. 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 | 1.50 | 0.045 | 0.059 |
| F2 | 1.15 | 1.50 | 0.045 | 0.059 |
| 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 |

Table 7. $I^2PAK$ dimensions




| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.30 | | 4.60 | 0.169 | | 0.181 |
| A1 | 2.49 | | 2.69 | 0.098 | | 0.106 |
| b | 0.70 | | 0.93 | 0.028 | | 0.037 |
| b1 | 1.20 | | 1.38 | 0.047 | | 0.054 |
| b2 | 1.25 | 1.40 | | 0.049 | 0.055 | |
| c | 0.45 | | 0.60 | 0.018 | | 0.024 |
| c2 | 1.21 | | 1.36 | 0.048 | | 0.054 |
| D | 8.95 | | 9.35 | 0.352 | | 0.368 |
| e | 2.44 | | 2.64 | 0.096 | | 0.104 |
| E | 10.00 | | 10.28 | 0.394 | | 0.405 |
| L | 13.10 | | 13.60 | 0.516 | | 0.535 |
| L1 | | 3.75 | | | 0.148 | |
| L2 | 1.27 | | 1.40 | 0.050 | | 0.055 |
| V | | 5° | | | 5° | |
| V4 | | 45° | | | 45° | |

# 3 Ordering information



**Table 8. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STPS30M100ST | STPS30M100ST | TO-220AB | 2.3 g | 50 | Tube |
| STPS30M100SFP | STPS30M100SFP | TO-220FPAB | 2.0 g | 50 | Tube |
| STPS30M100SR | STPS30M100SR | $I^2PAK$ | 1.49 g | 50 | Tube |

# 4 Revision history

**Table 9. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 25-Mar-2009 | 1 | First issue |

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