



# STPS1545C

## Power Schottky rectifier

### Main product characteristics

|             |           |
|-------------|-----------|
| $I_{F(AV)}$ | 2 x 7.5 A |
| $V_{RRM}$   | 45 V      |
| $T_j$ (max) | 175° C    |
| $V_F$ (max) | 0.57 V    |

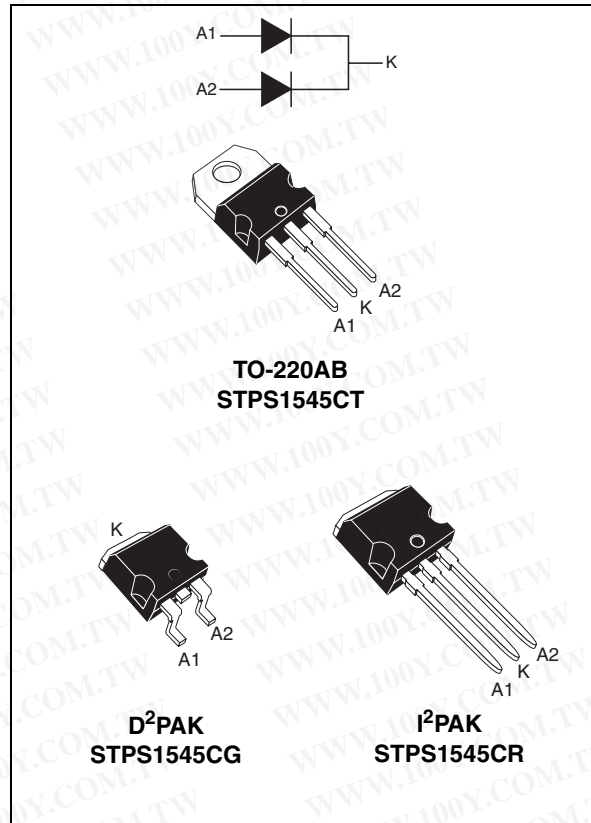
### Features and Benefits

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Avalanche capability specified

### Description

Dual center tap Schottky rectifier suited for SwitchMode Power Supply and high frequency DC to DC converters.

Packaged either in TO-220AB, D<sup>2</sup>PAK or I<sup>2</sup>PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



# 1 Characteristics

**Table 1. Absolute Ratings (limiting values)**

| Symbol       | Parameter   |  | Value        | Unit             |
|--------------|---|--|--------------|------------------|
| $V_{RRM}$    | Repetitive peak reverse voltage                       |  | 45           | V                |
| $I_{F(RMS)}$ | RMS forward current                                   |  | 20           | A                |
| $I_{F(AV)}$  | Average forward current $\delta = 0.5$                | $T_c = 157^\circ\text{C}$ Per diode                  | 7.5          | A                |
| $I_{FSM}$    | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$<br>Sinusoidal                   | 150          | A                |
| $I_{RRM}$    | Peak repetitive reverse current                       | $t_p = 2\ \mu\text{s}$ square<br>$F = 1\ \text{kHz}$ | 1            | A                |
| $I_{RSM}$    | Non repetitive peak reverse current                   | $t_p = 100\ \mu\text{s}$ square                      | 2            | A                |
| $P_{ARM}$    | Repetitive peak avalanche power                       | $t_p = 1\ \mu\text{s}$ $T_j = 25^\circ\text{C}$      | 2700         | W                |
| $T_{stg}$    | Storage temperature range                             |  | -65 to + 175 | $^\circ\text{C}$ |
| $T_j$        | Maximum operating junction temperature <sup>(1)</sup> |  | 175          | $^\circ\text{C}$ |
| $dV/dt$      | Critical rate of rise of reverse voltage              |  | 10000        | V/ $\mu\text{s}$ |

1.  $\frac{dP_{Tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  thermal runaway condition for a diode on its own heatsink

**Table 2. Thermal resistances**

| Symbol        | Parameter        |           | Value | Unit               |
|---------------|------------------|-----------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 3.0   | $^\circ\text{C/W}$ |
|               |                  | Total     | 1.7   |                    |
| $R_{th(c)}$   | Coupling         |           | 0.35  |                    |

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

**Table 3. Static electrical characteristics (per diode)**

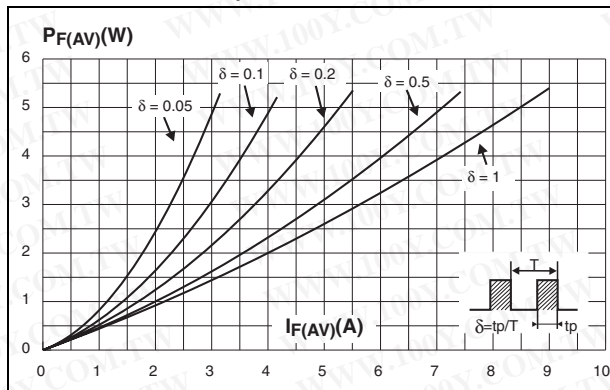
| Symbol      | Parameter               | Test Conditions           |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|---------------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$     |      |      | 100  | $\mu\text{A}$ |
|             |                         | $T_j = 125^\circ\text{C}$ |                     |      | 5    | 15   | mA            |
| $V_F^{(1)}$ | Forward voltage drop    | $T_j = 125^\circ\text{C}$ | $I_F = 7.5\text{A}$ |      | 0.5  | 0.57 | V             |
|             |                         | $T_j = 25^\circ\text{C}$  | $I_F = 15\text{A}$  |      |      | 0.84 |               |
|             |                         | $T_j = 125^\circ\text{C}$ | $I_F = 15\text{A}$  |      | 0.65 | 0.72 |               |

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

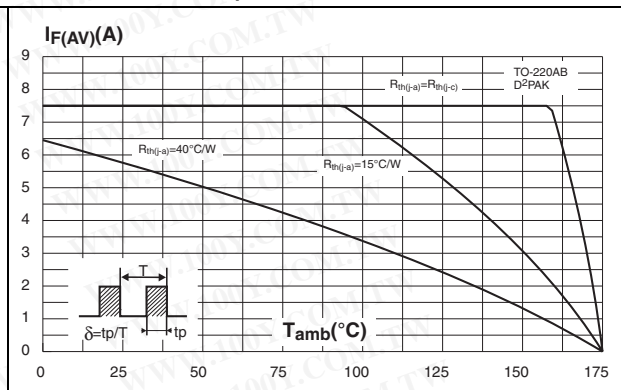
To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.020 I_{F(RMS)}^2$$

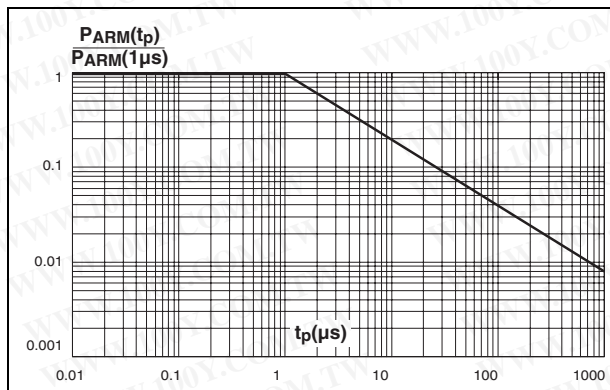
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



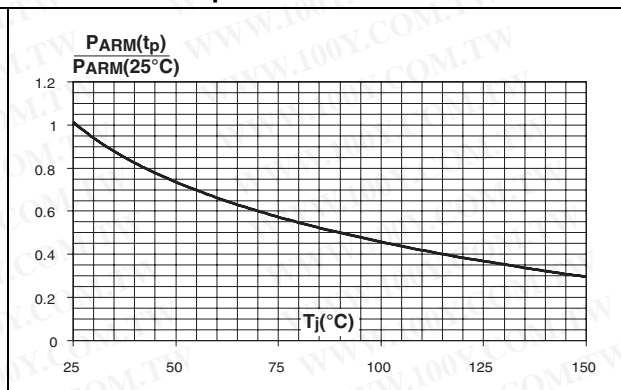
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



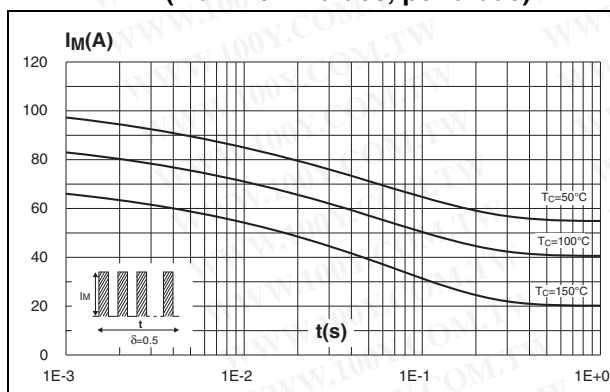
**Figure 3. Normalized avalanche power derating versus pulse duration**



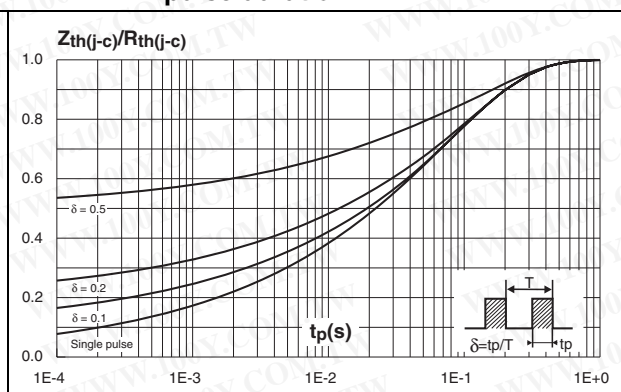
**Figure 4. Normalized avalanche power derating versus junction temperature**



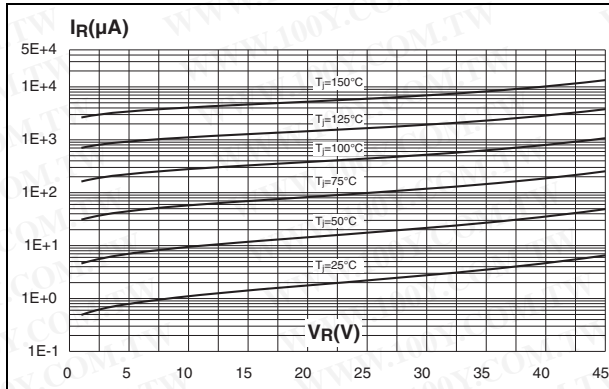
**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)**



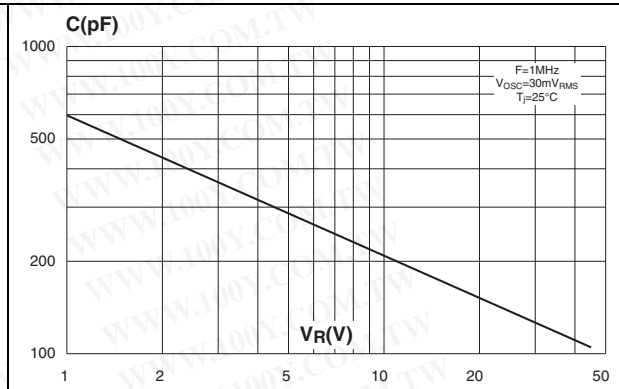
**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration**



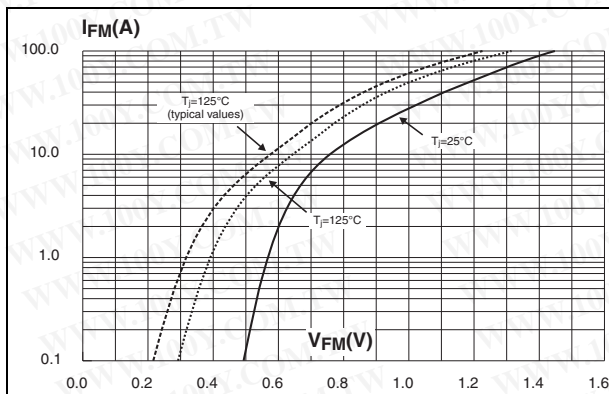
**Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



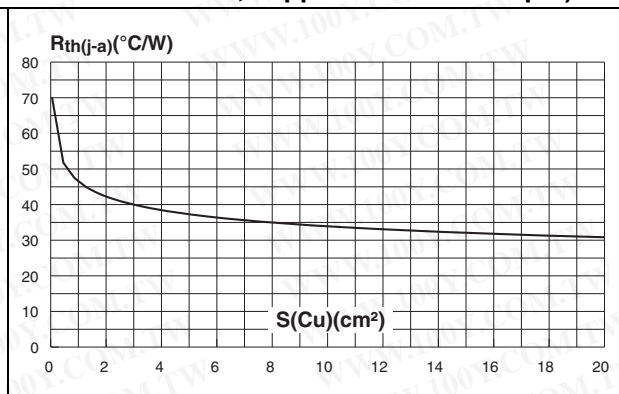
**Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 9. Forward voltage drop versus forward current (maximum values, per diode)**



**Figure 10. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board, copper thickness: 35  $\mu\text{m}$ )**



## 2 Package Information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 Nm
- Maximum torque value: 0.70 Nm

Figure 11. D<sup>2</sup>PAK dimensions

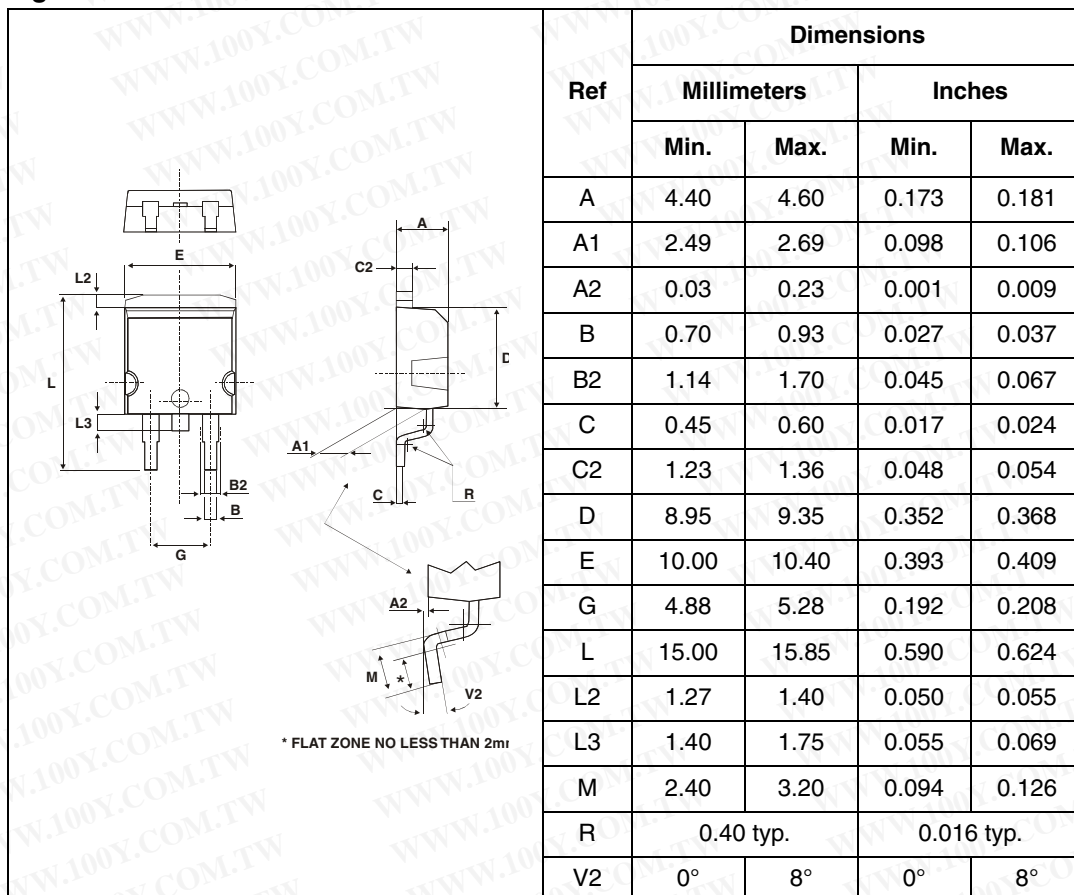


Figure 12. Footprint (dimensions in millimeters)

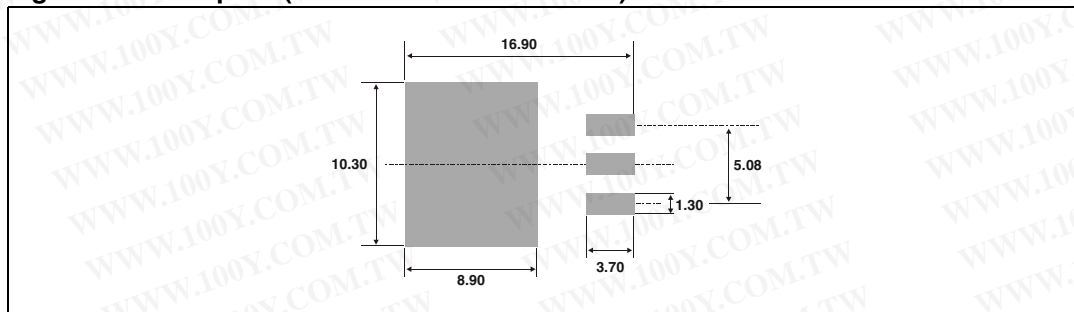


Figure 13. TO-220AB dimensions

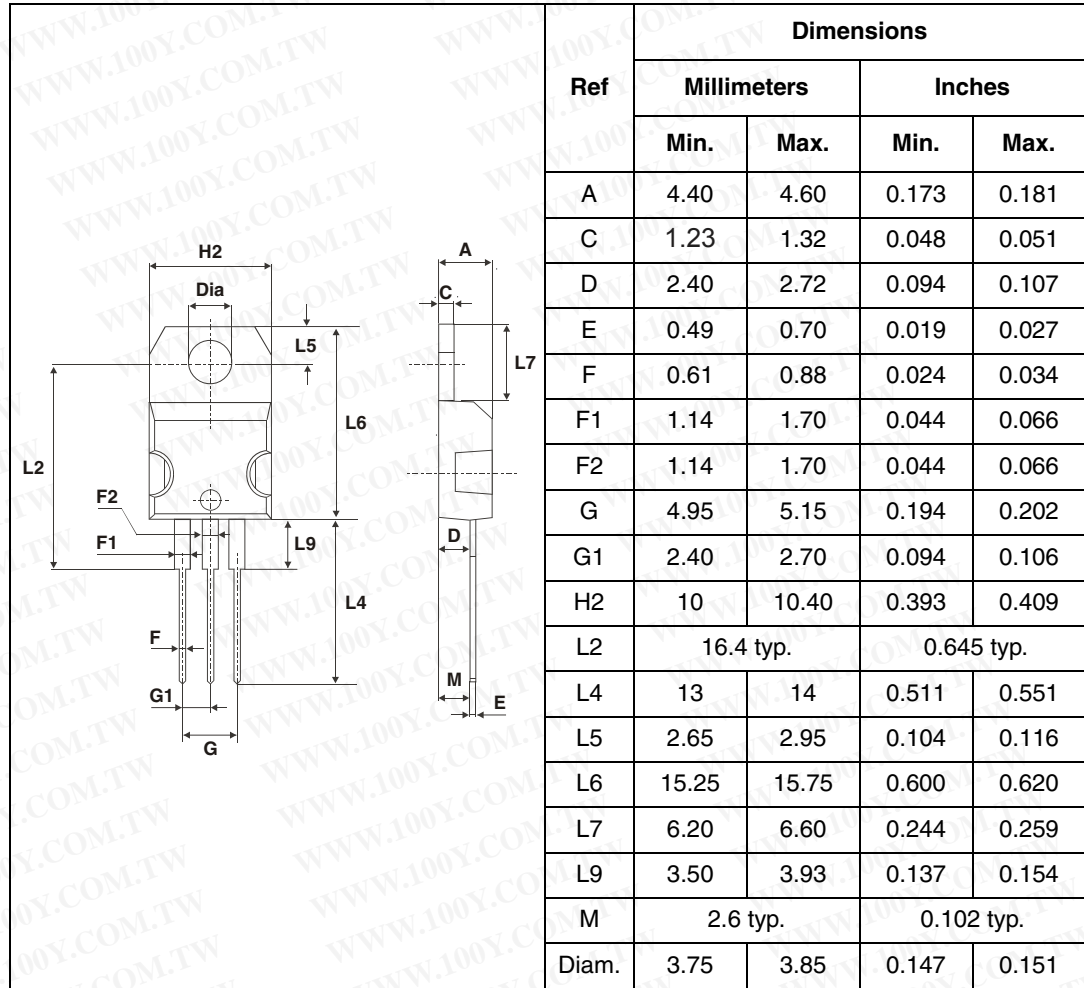
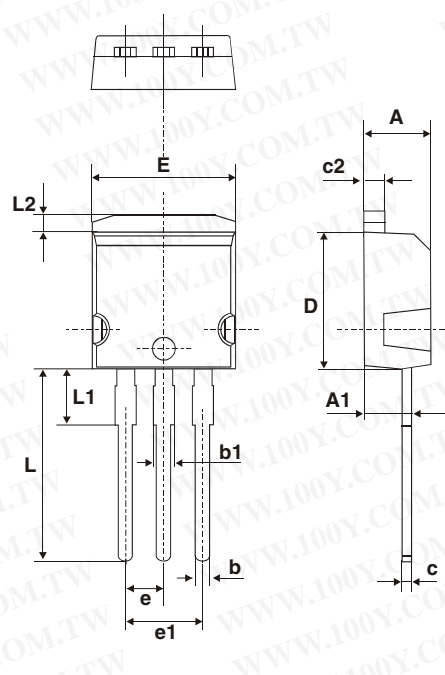


Figure 14. I<sup>2</sup>PAK dimensions



| Ref | Dimensions  |      |       |        |      |      |
|-----|-------------|------|-------|--------|------|------|
|     | Millimeters |      |       | Inches |      |      |
|     | Min.        | Typ. | Max.  | Min.   | Typ. | Max. |
| A   | 4.40        | 4.60 | 0.173 | 0.181  | A    | 4.40 |
| A1  | 2.49        | 2.69 | 0.098 | 0.106  | A1   | 2.49 |
| b   | 0.70        | 0.93 | 0.028 | 0.037  | b    | 0.70 |
| b1  | 1.14        | 1.17 | 0.044 | 0.046  | b1   | 1.14 |
| b2  | 1.14        | 1.17 | 0.044 | 0.046  | b2   | 1.14 |
| c   | 0.45        | 0.60 | 0.018 | 0.024  | c    | 0.45 |
| c2  | 1.23        | 1.36 | 0.048 | 0.054  | c2   | 1.23 |
| D   | 8.95        | 9.35 | 0.352 | 0.368  | D    | 8.95 |
| e   | 2.40        | 2.70 | 0.094 | 0.106  | e    | 2.40 |
| E   | 10.0        | 10.4 | 0.394 | 0.409  | E    | 10.0 |
| L   | 13.1        | 13.6 | 0.516 | 0.535  | L    | 13.1 |
| L1  | 3.48        | 3.78 | 0.137 | 0.149  | L1   | 3.48 |
| L2  | 1.27        | 1.40 | 0.050 | 0.055  | L2   | 1.27 |

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

### 3 Ordering Information

| Ordering type | Marking    | Package            | Weight | Base qty | Delivery mode |
|---------------|------------|--------------------|--------|----------|---------------|
| STPS1545CT    | STPS1545CT | TO-220AB           | 2.23 g | 50       | Tube          |
| STPS1545CG    | STPS1545CG | D <sup>2</sup> PAK | 1.48 g | 50       | Tube          |
| STPS1545CG-TR | STPS1545CG | D <sup>2</sup> PAK | 1.48 g | 1000     | Tape & reel   |
| STPS1545CR    | STPS1545CR | I <sup>2</sup> PAK | 1.49 g | 50       | Tube          |

### 4 Revision history

| Date        | Revision | Description of Changes                   |
|-------------|----------|--|
| Jul-2003    | 5F       | Last release.                            |
| 21-Mar-2007 | 6        | Removed ISOWATT and TO-220FPAB packages. |



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