# STPS50U100C

## Ultralow forward voltage power Schottky rectifier

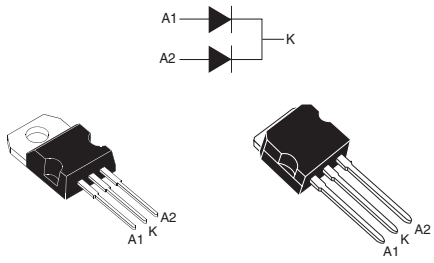
## Features

- Ultralow forward voltage drop
- High current capability
- High frequency operation
- ECOPACK®2 compliant components

## Description

The STPS50U100C is a dual power Schottky diode rectifier, suited for high frequency switch mode power supply.

Featuring an ultralow forward voltage drop, this device, packaged in TO-220AB and I²PAK, is intended to be used in notebook, game station and desktop adaptors as well as server SMPS. It has been especially designed to help power supply manufacturers meet the recently introduced worldwide efficiency standards.




**TO-220AB**
**STPS50U100CT**

**I²PAK**
**STPS50U100CR**

**Table 1. Device summary**

| Symbol | Value |
|---|---|
| $I_{F(AV)}$ | 2 x 25 A |
| $V_{RRM}$ | 100 V |
| $V_{F(TYP)}$ @ 25 A @ 125 °C | 0.64 V |
| $T_{j\ (max)}$ | 150 °C |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values per diode at 25 °C, unless otherwise specified)**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | | 100 | V |
| $I_{F(RMS)}$ | Forward rms current | | | 50 | A |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$ | $T_C$ = 120 °C<br>$T_C$ = 105 °C | Per diode<br>Per device | 25<br>50 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms, half sine-wave | | 250 | A |
| $T_{stg}$ | Storage temperature range | | | -65 to + 150 | °C |
| $T_j$ | Maximum operating junction temperature(1) | | | 150 | °C |

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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 | Per diode<br>Per device | 1.3<br>0.9 | °C/W |
| $R_{th\ (c)}$ | Coupling | | 0.45 | °C/W |

When the diodes 1 and 2 are used simultaneously:
$\Delta T_j$(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

**Table 4. Static electrical characteristics**

| Symbol | Parameter | Tests conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$ | Reverse leakage current | $T_j$ = 25 °C | $V_R$ = 70 V | - | 15 | - | µA |
| | | $T_j$ = 125 °C | | - | 10 | - | mA |
| | | $T_j$ = 25 °C | $V_R = V_{RRM}$ | - | 30 | 200 | µA |
| | | $T_j$ = 125 °C | | - | 15 | 40 | mA |
| $V_F$ | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 5 A | - | 0.48 | - | V |
| | | $T_j$ = 125 °C | | - | 0.38 | - | |
| | | $T_j$ = 25 °C | $I_F$ = 15 A | - | 0.58 | - | |
| | | $T_j$ = 125 °C | | - | 0.54 | - | |
| | | $T_j$ = 25 °C | $I_F$ = 25 A | - | 0.67 | 0.73 | |
| | | $T_j$ = 125 °C | | - | 0.64 | 0.7 | |

To evaluate the conduction losses use the following equation:

$P = 0.475 \times I_{F(AV)} + 0.009\ I_F{}^2{}_{(RMS)}$

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

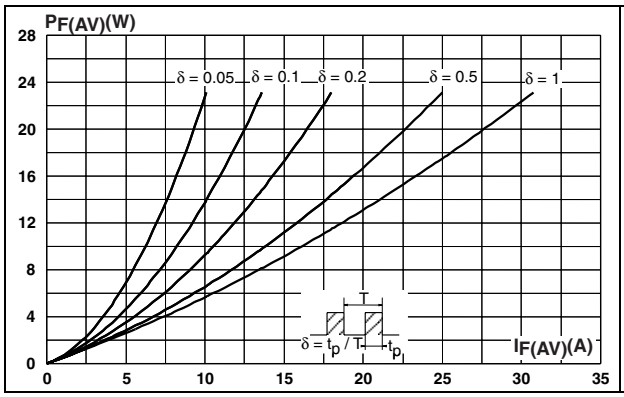



**Figure 2. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)**

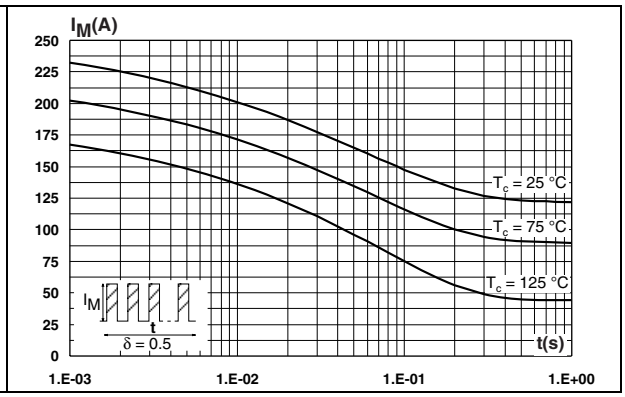



**Figure 3. Reverse leakage current versus reverse voltage applied (typical values, per diode)**

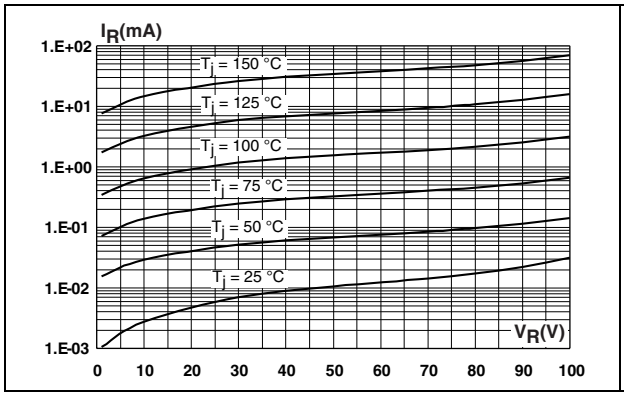



**Figure 4. Average forward current versus ambient temperature (δ = 0.5, per diode)**

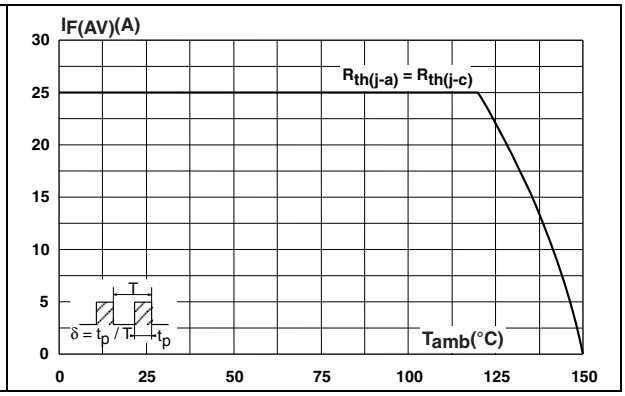



**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**

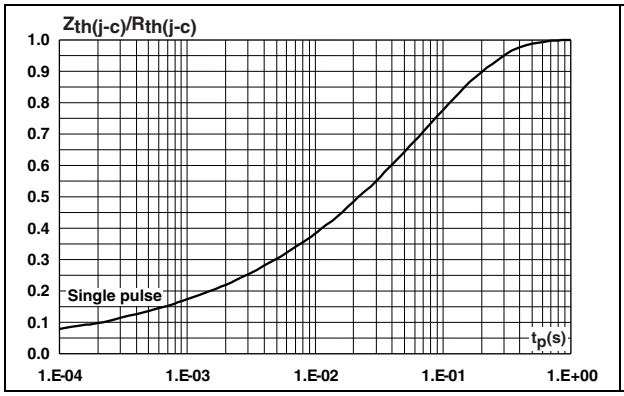



**Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)**

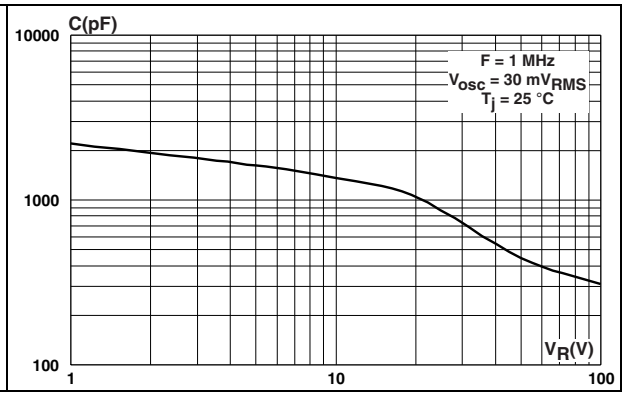
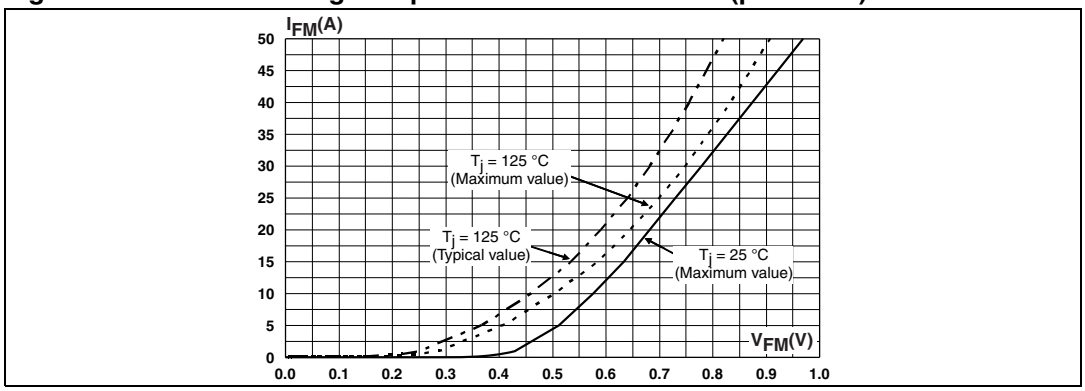


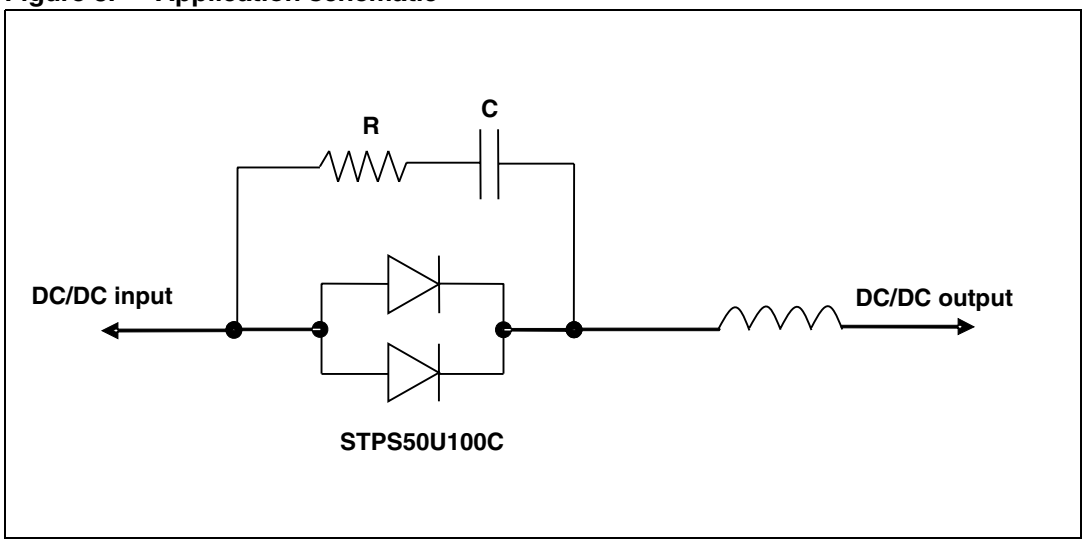
**Figure 7. Forward voltage drop versus forward current (per diode)**




# 2 Application information

It is mandatory to ensure a peak reverse voltage below the $V_{RRM}$ absolute rating. Therefore, it is recommended to use a RC clamping snubber circuit in parallel with the STPS50U100C device.

**Figure 8. Application schematic**

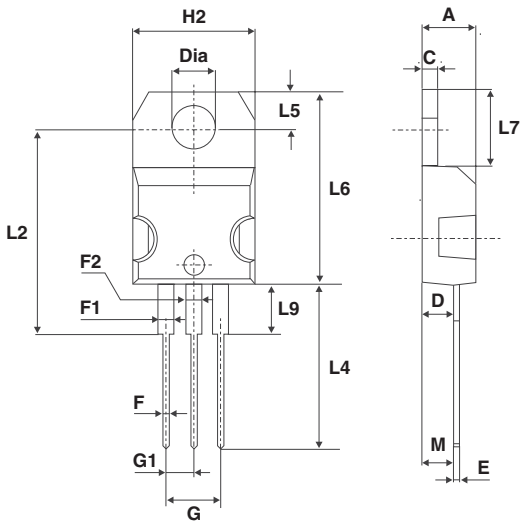


# 3 Package information

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

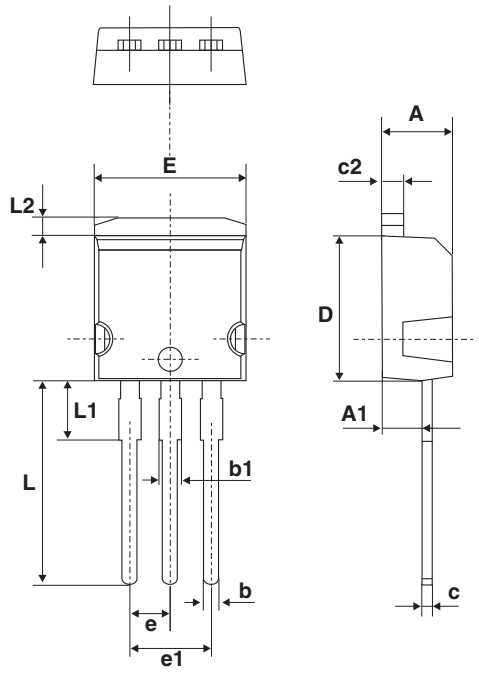
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**Table 5. TO-220AB dimensions**




| 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. $I^2PAK$ 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 |

# 4 Ordering information

**Table 7. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STPS50U100CT | STPS50U100C | TO-220AB | 2.23 g | 50 | Tube |
| STPS50U100CR | STPS50U100C | $I^2PAK$ | 1.49 g | 50 | Tube |

# 5 Revision history

**Table 8. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 17-Nov-2009 | 1 | First release. |

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