

STPS50U100C

ULVF™ power Schottky rectifier

Features

- ultralow forward voltage drop
- high current capability
- high frequency operation

Description

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

Featuring an ultralow forward voltage (ULVF) 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.

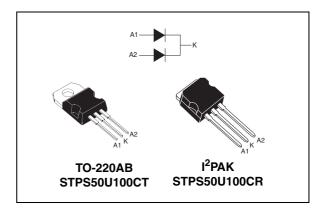


Table 1. Device summary

| 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 | | |

TM: ULVF is a trademark of STMicroelectronics

Characteristics STPS50U100C

1 Characteristics

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

| Symbol | Parameter | | | | Unit |
|---------------------|--|--|----------|--------------|------|
| V _{RRM} | Repetitive peak reverse voltage | | | 100 | V |
| I _{F(RMS)} | Forward rms current | | | 50 | Α |
| I _{F(AV)} | Average forward current, $\delta = 0.5$ $ T_C = 120 ^{\circ}C $ Per diode $ T_C = 105 ^{\circ}C $ Per device | | 25 50 | Α | |
| I _{FSM} | Surge non repetitive forward current $t_p = 10 \text{ ms}$, half sine-wave | | | 250 | Α |
| T _{stg} | Storage temperature range | | | -65 to + 150 | °C |
| Tj | 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 | nbol Parameter | | | Unit |
|-----------------------|------------------|-------------------------|------------|------|
| R _{th (j-c)} | Junction to case | Per diode Per device | 1.3 0.9 | °C/W |
| R _{th (c)} | Coupling | | 0.45 | °C/W |

When the diodes 1 and 2 are used simultaneously:

 $\Delta T_j(diode 1) = P(diode1) \times R_{th(j-c)}(Per diode) + P(diode2) \times R_{th(c)}$

Table 4. Static electrical characteristics

| Symbol | Parameter | Tests conditions | | Min. | Тур. | Max. | Unit |
|--|-------------------------|---|-----------------------|------|------|------|------|
| | | T _j = 25 °C | V _R = 70 V | - | 15 | - | μΑ |
| , | Povorca lankaga gurrant | T _j = 125 °C | | - | 10 | - | mA |
| I _R Reverse leakage current | T _j = 25 °C | \ \ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ | - | 30 | 200 | μΑ | |
| | | T _j = 125 °C | $V_R = V_{RRM}$ | - | 15 | 40 | mA |
| V _F Forward voltage drop | | T _j = 25 °C | I _F = 5 A | - | 0.48 | - | |
| | | T _j = 125 °C | | - | 0.38 | - | |
| | Forward voltage drap | T _j = 25 °C | I _F = 15 A | - | 0.58 | - | V |
| | Forward voitage drop | T _j = 125 °C | | - | 0.54 | - | V |
| | | 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: $P = 0.475 \text{ x } I_{F(AV)} + 0.009 I_{F}^{2}_{(RMS)}$

STPS50U100C Characteristics

Figure 1. Average forward power dissipation Figure 2. versus average forward current (per diode)

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

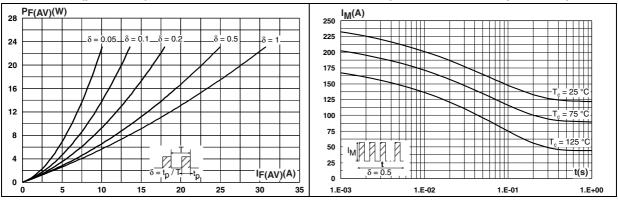


Figure 3. Reverse leakage current versus reverse voltage applied (typical values, per diode)

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

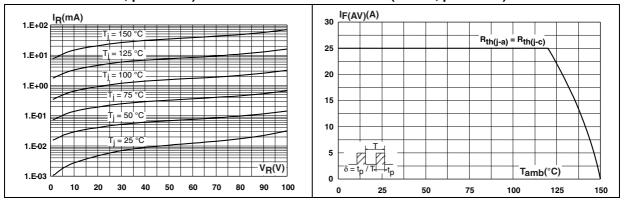
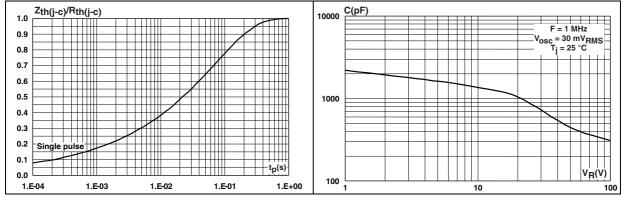


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

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



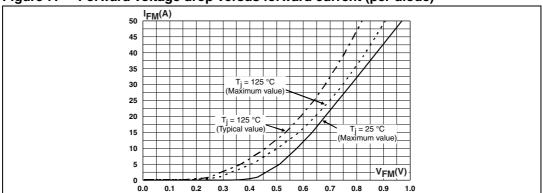
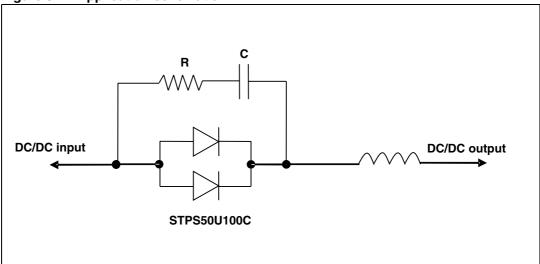


Figure 7. Forward voltage drop versus forward current (per diode)

2 Application information

It is mandatory to ensure a peak reverse voltage below the V_{RRM} absolute rating. ST recommends the use of an RC clamping snubber circuit in parallel with the STPS50U100C device.

Figure 8. Application schematic

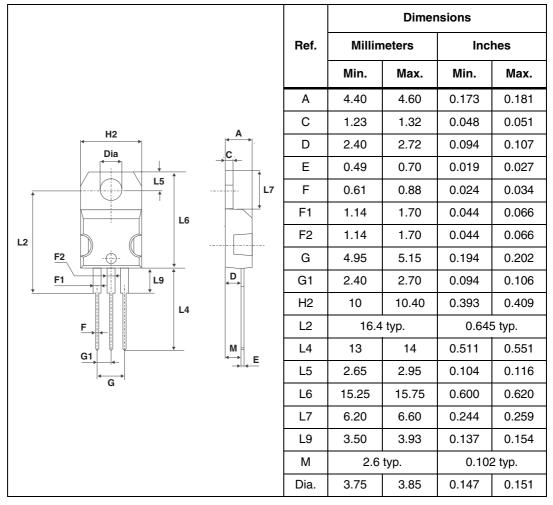


3 Package information

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

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.

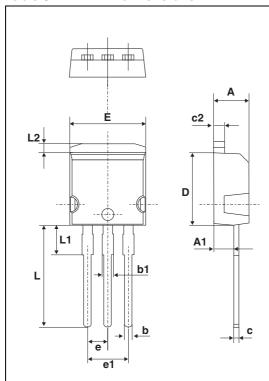
Table 5. TO-220AB dimensions



Package information STPS50U100C

Mounting (soldering) the I^2 PAK metal slug (heatsink) with alloy, like a surface mount device, IS NOT PERMITTED. A standard through-hole mounting is mandatory.

Table 6. I²PAK dimensions



| | Dimensions | | | | |
|------|-------------|-------|--------|-------|--|
| Ref. | Millimeters | | Inches | | |
| | Min. Max. | | Min. | Max. | |
| Α | 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 | |
| С | 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 | |
| е | 2.40 | 2.70 | 0.094 | 0.106 | |
| e1 | 4.95 | 5.15 | 0.195 | 0.203 | |
| Е | 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 ² PAK | 1.49 g | 50 | Tube |

For the latest information on available order codes see the product pages on www.st.com.

5 Revision history

Table 8. Document revision history

| Date | Revision | Changes | |
|-------------|----------|-------------------------------------|--|
| 17-Nov-2009 | 1 | First release. | |
| 04-Nov-2010 | 2 | Added trademark statement for UVLF. | |

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577