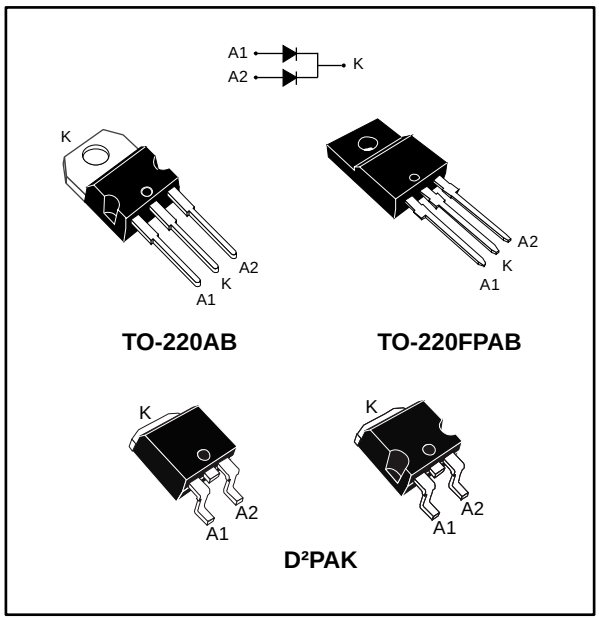
# STPS2045C

## Power Schottky rectifier

Datasheet - production data




## Description

Dual center tap Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters. Packaged either in TO-220AB, TO-220FPAB, or D²PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

**Table 1: Device summary**

| Symbol | Value |
|---|---|
| $I_{F(AV)}$ | 2 x 10 A |
| $V_{RRM}$ | 45 V |
| $V_F$ (typ.) | 0.5 V |
| $T_j$ (max.) | 175 °C |

## Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Insulated package: TO-220FPAB
  - Insulating voltage = 2000 $V_{RMS}$ sine
- Avalanche rated
- ECOPACK®2 compliant component for D²PAK on demand

# 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 | | | | 45 | V |
| $I_{F(RMS)}$ | Forward rms current | | | | 30 | A |
| $I_{F(AV)}$ | Average forward current δ = 0.5, square wave | TO-220AB / D²PAK | $T_C$ = 155 °C | Per diode | 10 | A |
| | | | | Per device | 20 | |
| | | TO-220FPAB | $T_C$ = 140 °C | Per diode | 10 | |
| | | | $T_C$ = 125 °C | Per device | 20 | |
| $I_{FSM}$ | Surge non repetitive forward current | | | $t_p$ = 10 ms sinusoidal | 180 | A |
| $P_{ARM}$ (1) | Repetitive peak avalanche power | | | $t_p$ = 10 µs, $T_j$ = 125 °C | 280 | W |
| $V_{ARM}$ (2) | Maximum repetitive peak avalanche voltage | | | $t_p$ < 10 µs, $T_j$ < 125 °C, $I_{AR}$ < 7.7 A | 60 | V |
| $V_{ASM}$ (2) | Maximum single-pulse peak avalanche voltage | | | | | |
| $T_{stg}$ | Storage temperature range | | | | -65 to +175 | °C |
| $T_j$ | Maximum operating junction temperature (3) | | | | 175 | |

**Notes:**

(1)For pulse time duration deratings, please refer to *Figure 3*. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the STMicroelectronics Application notes AN1768, “Admissible avalanche power of Schottky diodes” and AN2025, “Converter improvement using Schottky rectifier avalanche specification”.

(2)See *Figure 9*.

(3)$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

**Table 3: Thermal parameters**

| Symbol | Parameter | | | Max. value | Unit |
|---|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | TO-220AB / D²PAK | Per diode | 2.2 | °C/W |
| | | | Total | 1.4 | |
| | | TO-220FPAB | Per diode | 4.5 | |
| | | | Total | 3.5 | |
| $R_{th(c)}$ | Coupling | TO-220AB / D²PAK | | 0.4 | |
| | | TO-220FPAB | | 2.5 | |

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\,(diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) $+ P_{(diode2)} \times R_{th(c)}$

**Table 4: Static electrical characteristics (per diode)**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$ (1) | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | - | | 100 | µA |
| | | $T_j$ = 125 °C | | - | 7 | 15 | mA |
| $V_F$ (1) | Forward voltage drop | $T_j$ = 125 °C | $I_F$ = 10 A | - | 0.5 | 0.57 | V |
| | | $T_j$ = 25 °C | $I_F$ = 20 A | - | | 0.84 | |
| | | $T_j$ = 125 °C | | - | 0.65 | 0.72 | |

**Notes:**

(1)Pulse test: $t_p$ = 380 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 0.42 \times I_{F(AV)} + 0.015 \times I_{F}^{2}{}_{(RMS)}$

## 1.1 Characteristics (curves)

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

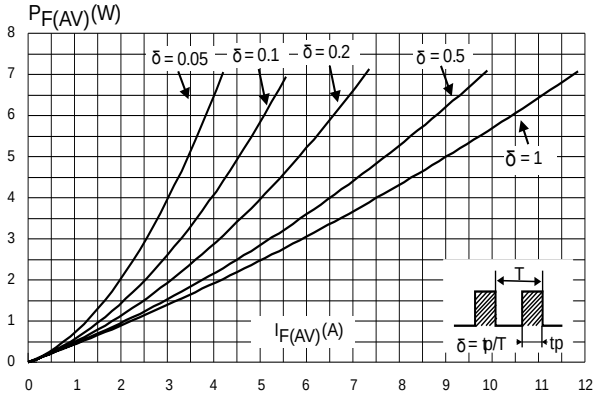



**Figure 2: Average forward current versus ambient temperature (δ = 0.5, per diode)**

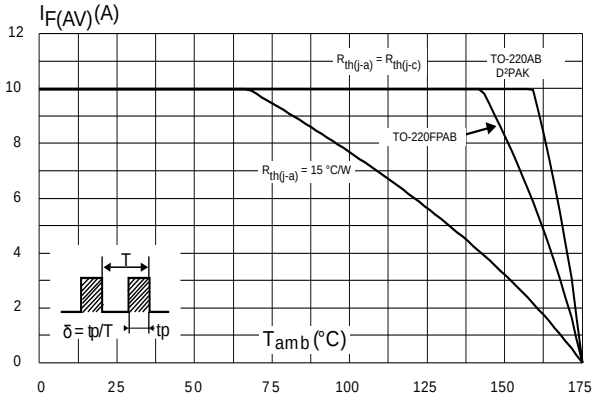



**Figure 3: Normalized avalanche power deratings versus pulse duration ($T_j$ = 125 °C)**

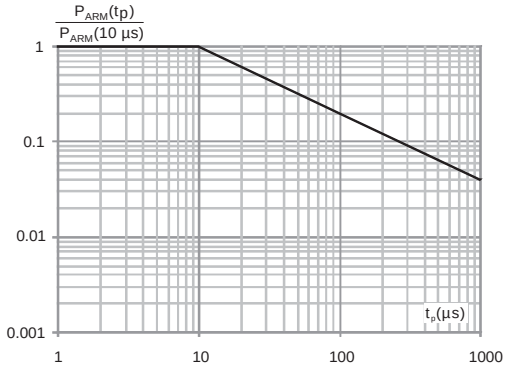



**Figure 4: Reverse leakage current versus reverse voltage applied (typical values, per diode)**

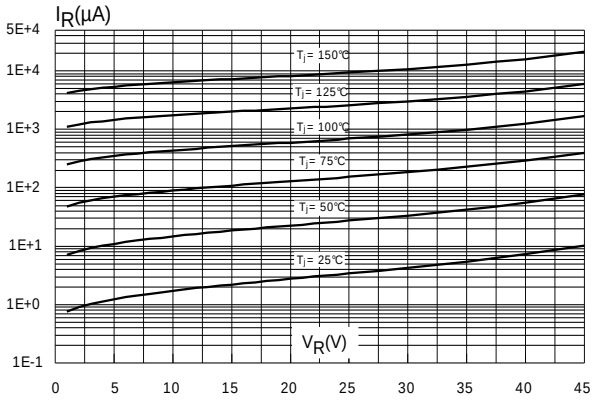



**Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK)**

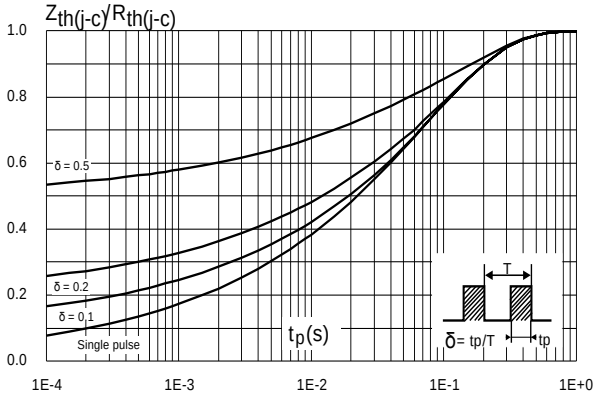



**Figure 6: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**