

## POWER SCHOTTKY RECTIFIER

**Table 1: Main Product Characteristics**

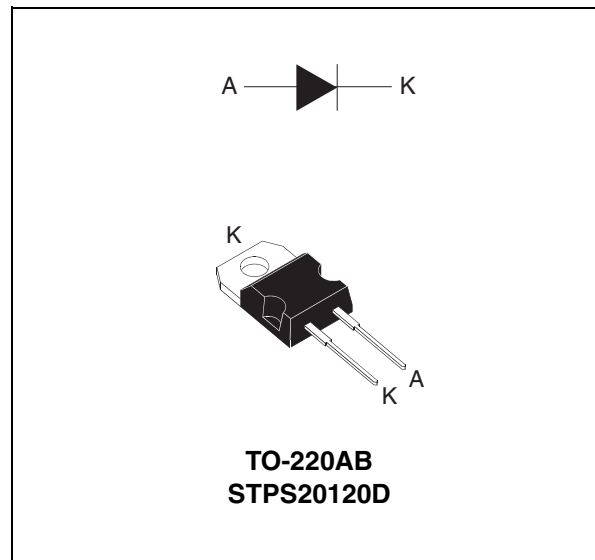
|             |               |
|-------------|---------------|
| $I_{F(AV)}$ | <b>20 A</b>   |
| $V_{RRM}$   | <b>120 V</b>  |
| $T_j$ (max) | <b>175°C</b>  |
| $V_F$ (typ) | <b>0.54 V</b> |

### FEATURES AND BENEFITS

- High junction temperature capability
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop

### DESCRIPTION

Single Schottky rectifier suited for high frequency Switch Mode Power Supply. Packaged in TO-220AC, this device is intended to be used in notebook & LCD adaptors, desktop SMPS, providing in these applications a margin between the remaining voltages applied on the diode and the voltage capability of the diode.



**Table 2: Order Code**

| Part Number | Marking    |
|-------------|------------|
| STPS20120D  | STPS20120D |

**Table 3: Absolute Ratings (limiting values)**

| Symbol       | Parameter                                | Value   | Unit |
|--------------|--|---|------|
| $V_{RRM}$    | Repetitive peak reverse voltage          | 120   | V    |
| $I_{F(RMS)}$ | RMS forward current                      | 30  | A    |
| $I_{F(AV)}$  | Average forward current                  | $\delta = 0.5 \quad T_c = 130^\circ\text{C}$      | A    |
| $I_{FSM}$    | Surge non repetitive forward current     | $t_p = 10\text{ms sinusoidal}$                    | A    |
| $P_{ARM}$    | Repetitive peak avalanche power          | $t_p = 1\mu\text{s} \quad T_j = 25^\circ\text{C}$ | W    |
| $T_{stg}$    | Storage temperature range                | -65 to + 175                                      | °C   |
| $T_j$        | Maximum operating junction temperature * | 175   | °C   |

\* :  $\frac{dP_{tot}}{dT_j} > \frac{1}{R_{th(j-a)}}$  thermal runaway condition for a diode on its own heatsink

## STPS20120D

**Table 4: Thermal Parameters**

| Symbol        | Parameter        | Value | Unit |
|---------------|------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case | 2.2   | °C/W |

**Table 5: Static Electrical Characteristics**

| Symbol   | Parameter               | Tests conditions          |                    | Min. | Typ  | Max. | Unit          |
|----------|-------------------------|---------------------------|--------------------|------|------|------|---------------|
| $I_R$ *  | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$    |      |      | 20   | $\mu\text{A}$ |
|          |                         | $T_j = 125^\circ\text{C}$ |                    |      | 3    | 10   | mA            |
| $V_F$ ** | Forward voltage drop    | $T_j = 25^\circ\text{C}$  | $I_F = 5\text{A}$  |      |      | 0.7  | V             |
|          |                         | $T_j = 125^\circ\text{C}$ |                    |      | 0.54 | 0.58 |               |
|          |                         | $T_j = 25^\circ\text{C}$  | $I_F = 10\text{A}$ |      |      | 0.8  |               |
|          |                         | $T_j = 125^\circ\text{C}$ |                    |      | 0.62 | 0.66 |               |
|          |                         | $T_j = 25^\circ\text{C}$  | $I_F = 20\text{A}$ |      |      | 0.93 |               |
|          |                         | $T_j = 125^\circ\text{C}$ |                    |      | 0.72 | 0.76 |               |

Pulse test: \*  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

\*\*  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:  $P = 0.56 \times I_{F(AV)} + 0.010 I_F^2(\text{RMS})$

Figure 1: Average forward power dissipation versus average forward current

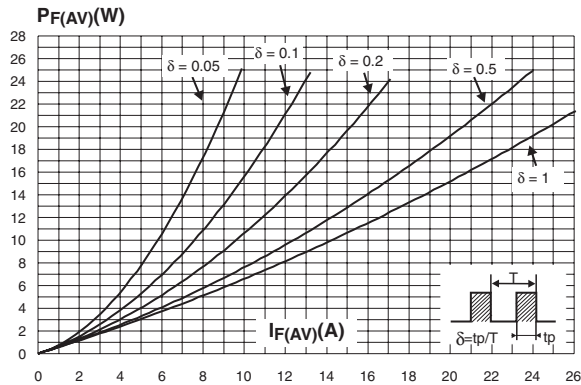


Figure 2: Average forward current versus ambient temperature ( $\delta = 0.5$ )

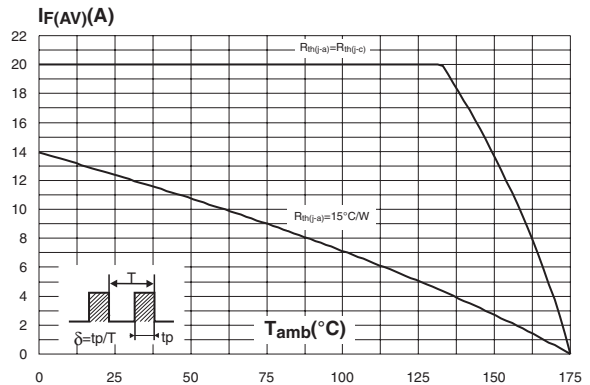


Figure 3: Normalized avalanche power derating versus pulse duration

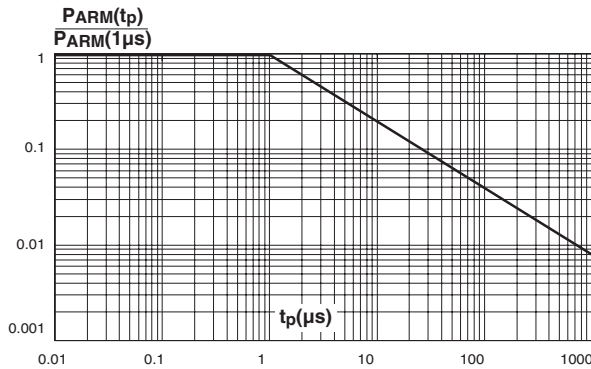


Figure 4: Normalized avalanche power derating versus junction temperature

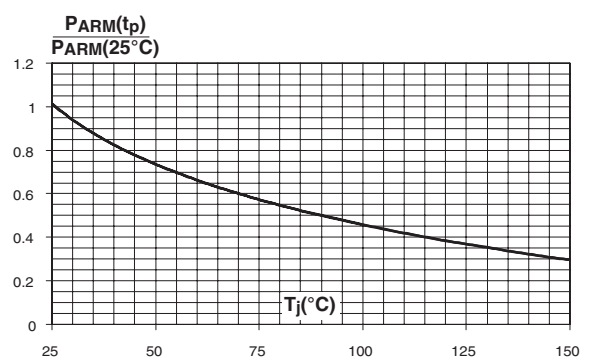


Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values)

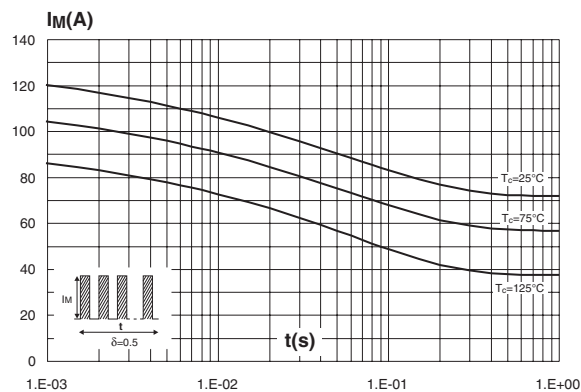
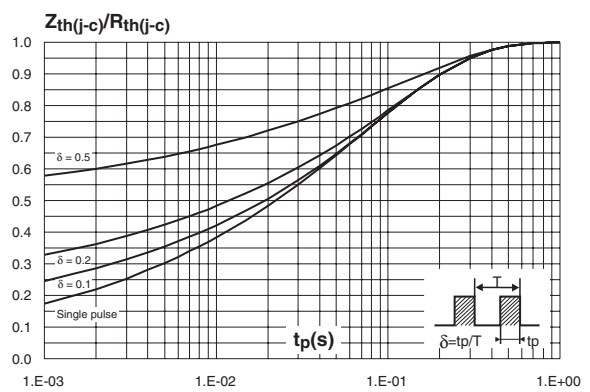
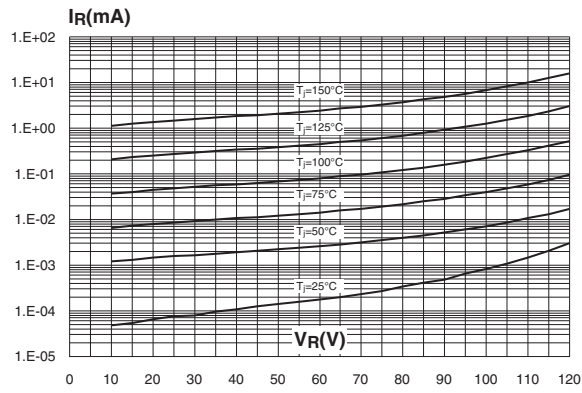


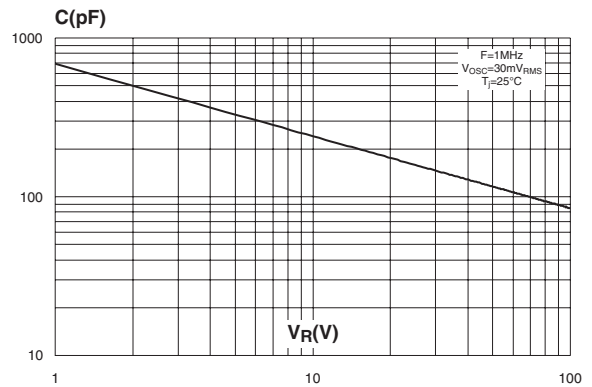
Figure 6: Relative variation of thermal impedance junction to ambient versus pulse duration



**Figure 7: Reverse leakage current versus reverse voltage applied (typical values)**



**Figure 8: Junction capacitance versus reverse voltage applied (typical values)**



**Figure 9: Forward voltage drop versus forward current**

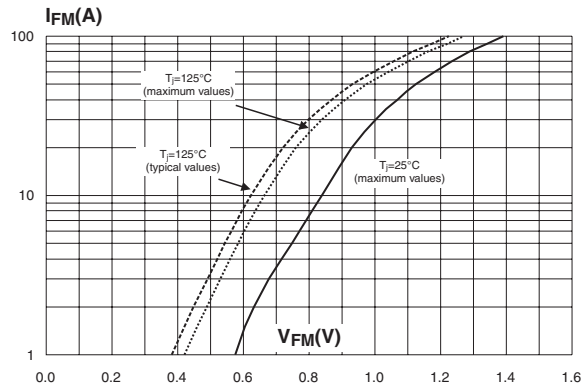


Figure 10: TO-220AC Package Mechanical Data

| 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 |
| G       | 4.95        | 5.15  | 0.194      | 0.202 |
| H2      | 10.00       | 10.40 | 0.393      | 0.409 |
| L2      | 16.40 typ.  |       | 0.645 typ. |       |
| L4      | 13.00       | 14.00 | 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. I | 3.75        | 3.85  | 0.147      | 0.151 |

Table 6: Ordering Information

| Ordering type | Marking    | Package  | Weight | Base qty | Delivery mode |
|---------------|------------|----------|--------|----------|---------------|
| STPS20120D    | STPS20120D | TO-220AC | 1.90 g | 50       | Tube          |

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

Table 7: Revision History

| Date        | Revision | Description of Changes |
|-------------|----------|------------------------|
| 18-Feb-2005 | 1        | First issue.           |

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