

Main product characteristics

| | |
|--------------|----------|
| $I_{F(AV)}$ | 2 x 10 A |
| V_{RRM} | 120 V |
| $T_{j(max)}$ | 175° C |
| $V_{F(typ)}$ | 0.54 V |

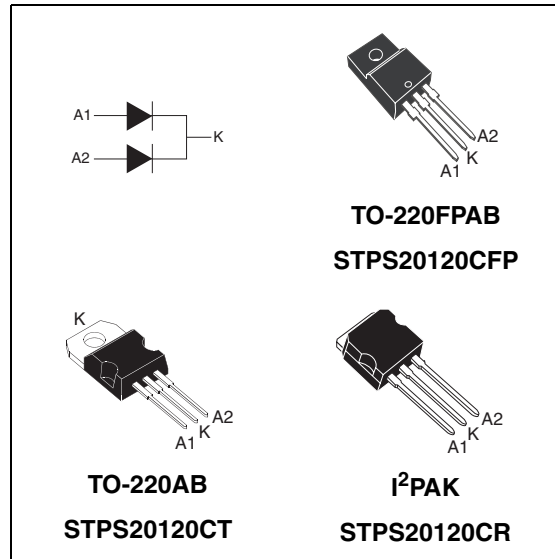
Feature and benefits

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

Description

Dual center tap Schottky rectifier suited for high frequency switch mode power supply.

Packaged in TO-220AB, I²PAK and TO-220FPAB, this device is intended to be used in notebook and 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.



Order code

| Part Number | Marking |
|--------------|--------------|
| STPS20120CT | STPS20120CT |
| STPS20120CR | STPS20120CR |
| STPS20120CFP | STPS20120CFP |

Table 1. Absolute ratings (limiting values, per diode)

| 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, $\delta = 0.5$ | TO-220AB, I ² PAK | $T_c = 150^\circ\text{C}$ Per diode | 10 | A |
| | | | $T_c = 145^\circ\text{C}$ Per device | 20 | |
| | | TO-220FPAB | $T_c = 125^\circ\text{C}$ Per diode | 10 | |
| | | | $T_c = 100^\circ\text{C}$ Per device | 20 | |
| I_{FSM} | Surge non repetitive forward current | | $t_p = 10\text{ ms}$ Sinusoidal | 150 | A |
| P_{ARM} | Repetitive peak avalanche power | | $t_p = 1\ \mu\text{s}$ $T_j = 25^\circ\text{C}$ | 4600 | W |
| T_{stg} | Storage temperature range | | -65 to + 175 | ° C | |
| T_j | Maximum operating junction temperature ⁽¹⁾ | | 175 | ° C | |

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

1 Characteristics

Table 2. Thermal parameters

| Symbol | Parameter | | Value | Unit | |
|---------------|------------------|---------------------|--------------------|------------|-------|
| $R_{th(j-c)}$ | Junction to case | $I^2PAK / TO-220AB$ | Per diode Total | 3 1.8 | ° C/W |
| | | TO-220FPAB | Per diode Total | 5.5 4.5 | |
| $R_{th(c)}$ | Coupling | $I^2PAK / TO-220AB$ | Total | 0.6 | |
| | | TO-220FPAB | | 3.5 | |

When the diodes 1 and 2 are used simultaneously :
 $T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode } 2) \times R_{th(c)}$

Table 3. Static electrical characteristics (per diode)

| Symbol | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|---------------------|-----------------|------|------|---------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25^\circ C$ | $V_R = V_{RRM}$ | | 10 | μA |
| | | $T_j = 125^\circ C$ | | 1.5 | 5 | mA |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25^\circ C$ | $I_F = 2.5 A$ | | 0.7 | V |
| | | $T_j = 125^\circ C$ | | 0.54 | 0.58 | |
| | | $T_j = 25^\circ C$ | $I_F = 10 A$ | | 0.92 | |
| | | $T_j = 125^\circ C$ | | 0.7 | 0.74 | |
| | | $T_j = 25^\circ C$ | $I_F = 20 A$ | | 1.02 | |
| | | $T_j = 125^\circ C$ | | 0.81 | 0.86 | |

1. Pulse test : $t_p = 5 \text{ ms}$, $\delta < 2\%$
2. Pulse test : $t_p = 380 \mu s$, $\delta < 2\%$

To evaluate the maximum conduction losses use the following equation :
 $P = 0.62 \times I_{F(AV)} + 0.012 I_{F(RMS)}^2$

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

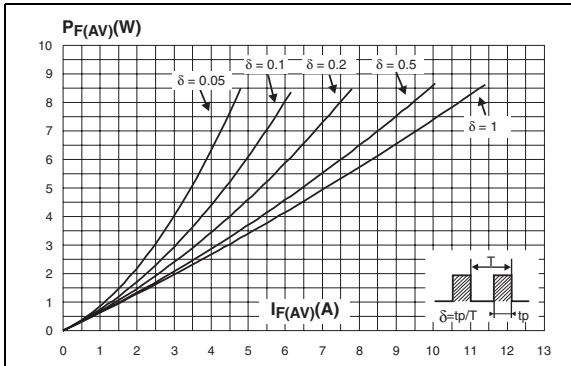


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

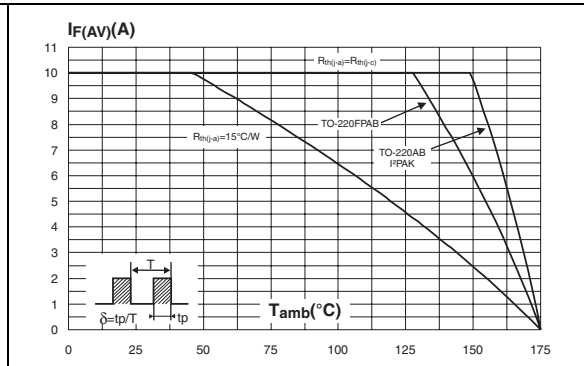


Figure 3. Normalized avalanche power derating versus pulse duration

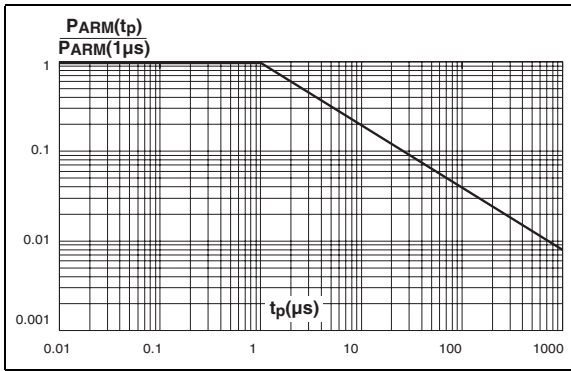


Figure 4. Normalized avalanche power derating versus junction temperature

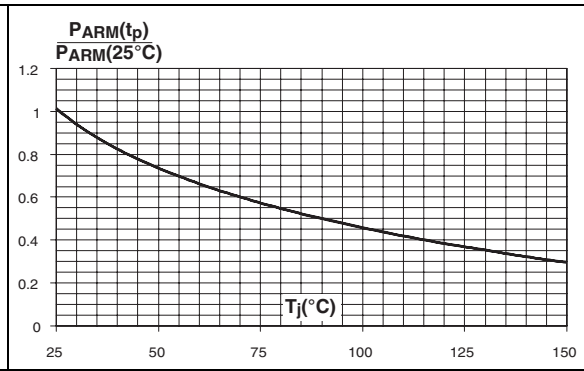


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB / I²PAK)

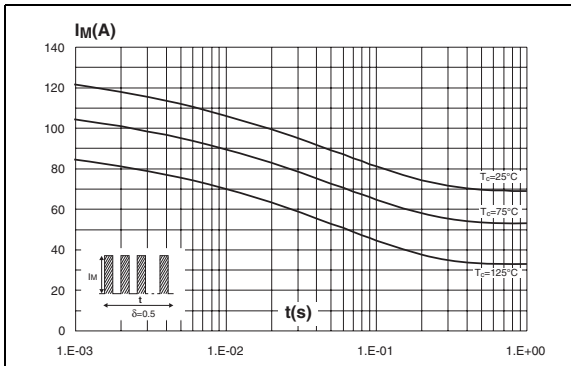


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)

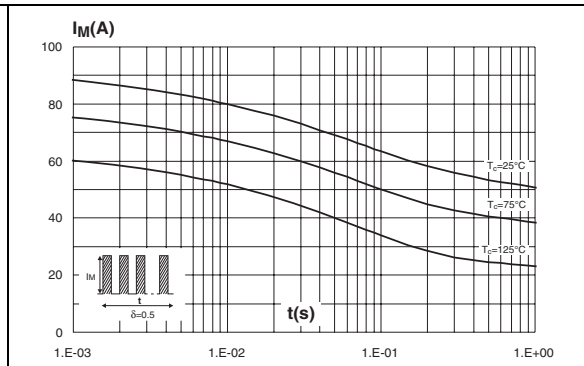


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB & I²PAK)

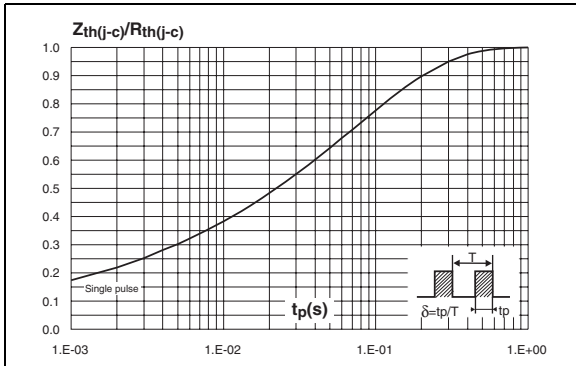


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

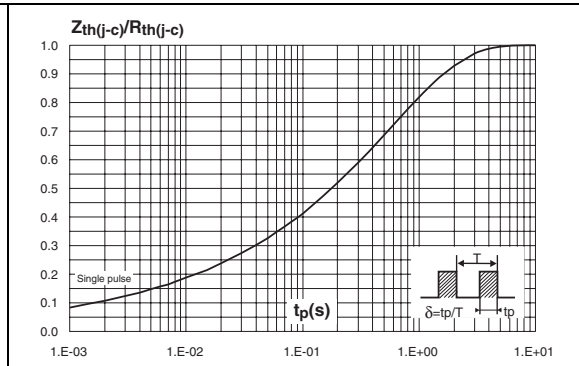


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

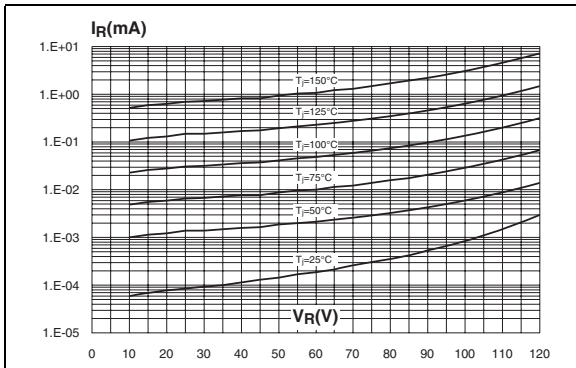


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

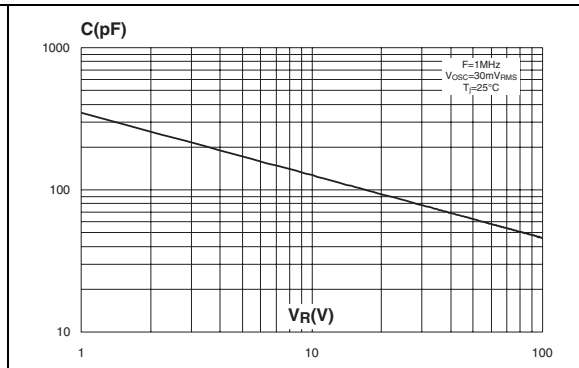
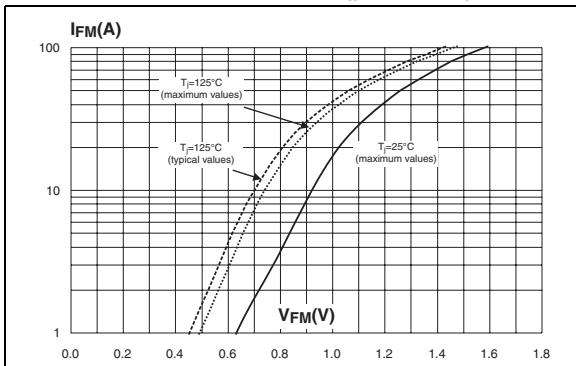


Figure 11. Forward voltage drop versus forward current (per diode)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 Nm
- Maximum torque value: 1.0 Nm

Table 4. 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 |

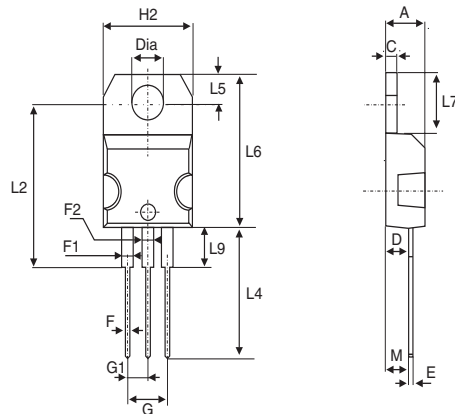


Table 5. I²PAK dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| A1 | 2.49 | 2.69 | 0.098 | 0.106 |
| b | 0.70 | 0.93 | 0.028 | 0.037 |
| b1 | 1.14 | 1.70 | 0.044 | 0.067 |
| b2 | 1.14 | 1.70 | 0.044 | 0.067 |
| c | 0.45 | 0.60 | 0.018 | 0.024 |
| c2 | 1.23 | 1.36 | 0.048 | 0.054 |
| D | 8.95 | 9.35 | 0.352 | 0.368 |
| e | 2.40 | 2.70 | 0.094 | 0.106 |
| E | 10.0 | 10.4 | 0.394 | 0.409 |
| L | 13.1 | 13.6 | 0.516 | 0.535 |
| L1 | 3.48 | 3.78 | 0.137 | 0.149 |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 |

Table 6. TO-220FPAB dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|-----------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.5 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| F2 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.4 | 2.7 | 0.094 | 0.106 |
| H | 10 | 10.4 | 0.393 | 0.409 |
| L2 | 16 Typ. | | 0.63 Typ. | |
| L3 | 28.6 | 30.6 | 1.126 | 1.205 |
| L4 | 9.8 | 10.6 | 0.386 | 0.417 |
| L5 | 2.9 | 3.6 | 0.114 | 0.142 |
| L6 | 15.9 | 16.4 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

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.

3 Ordering information

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|--------------|--------------------|--------|----------|---------------|
| STPS20120CT | STPS20120CT | TO-220AB | 2.23 g | 50 | Tube |
| STPS20120CR | STPS20120CR | I ² PAK | 1.49 g | 50 | Tube |
| STPS20120CFP | STPS20120CFP | TO-220FPAB | 2.0 g | 50 | Tube |

4 Revision history

| Date | Revision | Description of Changes |
|-------------|----------|-------------------------------------------------------------|
| 18-Feb-2005 | 1 | First issue |
| 03-May-2007 | 2 | Reformatted to current standards. Added TO-220FPAB package. |

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