

### Features

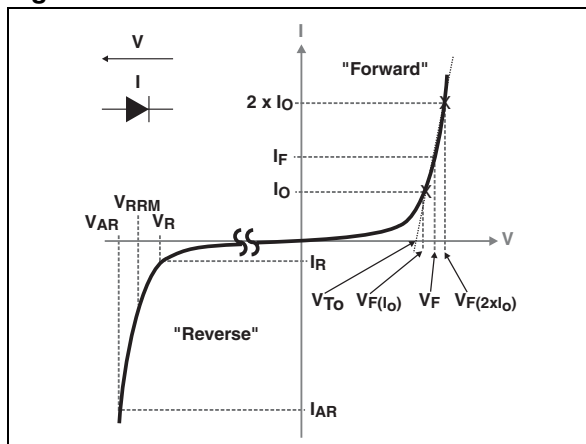
- High junction temperature capability
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop

### Description

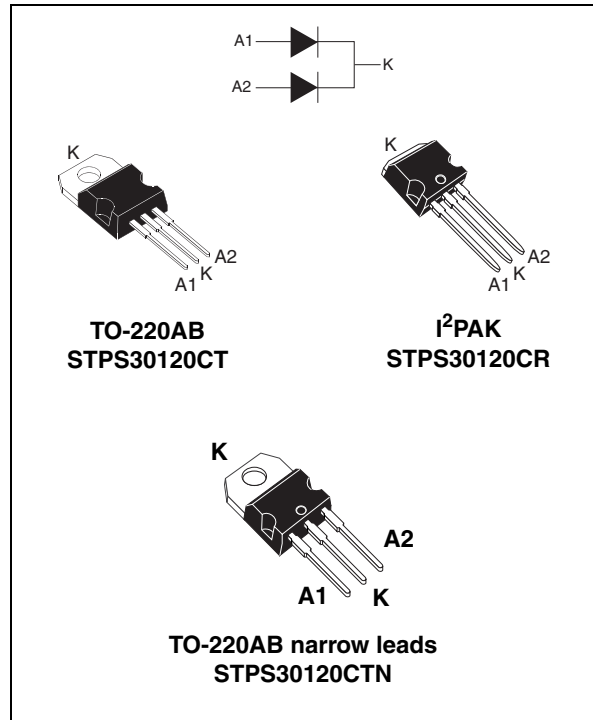
Dual center tap Schottky rectifier suited for high frequency switch mode power supply.

Packaged in TO-220AB, TO-220AB narrow leads, and I<sup>2</sup>PAK, 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.

**Figure 1. Electrical characteristics (a)**



- a.  $V_{ARM}$  and  $I_{ARM}$  must respect the reverse safe operating area defined in [Figure 10](#).  $V_{AR}$  and  $I_{AR}$  are pulse measurements ( $t_p < 1 \mu s$ ).  $V_R$ ,  $I_R$ ,  $V_{RRM}$  and  $V_F$  are static characteristics.



**Table 1. Device summary**

| Symbol       | Value    |
|--------------|----------|
| $I_{F(AV)}$  | 2 x 15 A |
| $V_{RRM}$    | 120 V    |
| $T_{j(max)}$ | 175 °C   |
| $V_{F(typ)}$ | 0.57 V   |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode)**

| Symbol                          | Parameter                                             |                                                                          |                                              | Value        | Unit |
|---------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------|--------------|------|
| V <sub>RRM</sub>                | Repetitive peak reverse voltage                       |                                                                          |                                              | 120          | V    |
| I <sub>F(RMS)</sub>             | Forward rms current                                   |                                                                          |                                              | 30           | A    |
| I <sub>F(AV)</sub>              | Average forward current                               | δ = 0.5<br>T <sub>c</sub> = 145 °C                                       | Per diode<br>Per device                      | 15<br>30     | A    |
| I <sub>FSM</sub>                | Surge non repetitive forward current                  |                                                                          | t <sub>p</sub> = 10 ms sinusoidal            | 180          | A    |
| P <sub>ARM</sub>                | Repetitive peak avalanche power                       |                                                                          | t <sub>p</sub> = 1 μs T <sub>j</sub> = 25 °C | 6700         | W    |
| V <sub>ARM</sub> <sup>(1)</sup> | Maximum repetitive peak avalanche voltage             | t <sub>p</sub> = 1 μs, T <sub>j</sub> < 150 °C, I <sub>AR</sub> < 13.4 A |                                              | 150          | V    |
| V <sub>ASM</sub> <sup>(1)</sup> | Maximum single pulse peak avalanche voltage           | t <sub>p</sub> = 1 μs, T <sub>j</sub> < 150 °C, I <sub>AR</sub> < 13.4 A |                                              | 150          | V    |
| T <sub>stg</sub>                | Storage temperature range                             |                                                                          |                                              | -65 to + 175 | °C   |
| T <sub>j</sub>                  | Maximum operating junction temperature <sup>(2)</sup> |                                                                          |                                              | 175          | °C   |

1. Refer to [Figure 10](#)

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

**Table 3. Thermal parameters**

| Symbol        | Parameter        |           | Value | Unit                 |
|---------------|------------------|-----------|-------|----------------------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 2.2   | $^{\circ}\text{C/W}$ |
|               |                  | Total     | 1.3   |                      |
| $R_{th(c)}$   | Coupling         | Total     | 0.3   | $^{\circ}\text{C/W}$ |

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 4. Static electrical characteristics (per diode)**

| Symbol      | Test conditions         |                                     |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-------------------------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^{\circ}\text{C}$  | $V_R = V_{RRM}$     |      |      | 15   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ }^{\circ}\text{C}$ |                     |      | 2.5  | 7.5  | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ }^{\circ}\text{C}$  | $I_F = 5\text{ A}$  |      |      | 0.74 | V             |
|             |                         | $T_j = 125\text{ }^{\circ}\text{C}$ |                     |      | 0.57 | 0.61 |               |
|             |                         | $T_j = 25\text{ }^{\circ}\text{C}$  | $I_F = 15\text{ A}$ |      |      | 0.92 |               |
|             |                         | $T_j = 125\text{ }^{\circ}\text{C}$ |                     |      | 0.7  | 0.74 |               |
|             |                         | $T_j = 25\text{ }^{\circ}\text{C}$  | $I_F = 30\text{ A}$ |      |      | 1.02 |               |
|             |                         | $T_j = 125\text{ }^{\circ}\text{C}$ |                     |      | 0.83 | 0.89 |               |

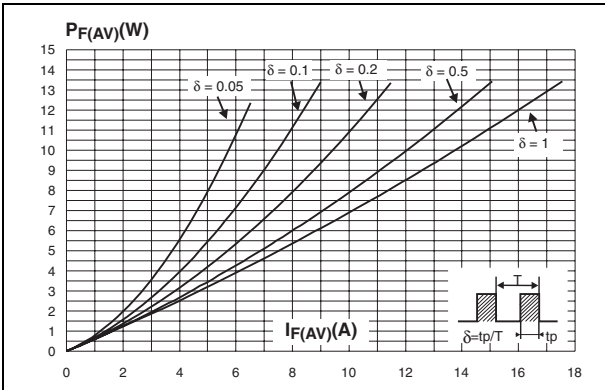
1. Pulse test :  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

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

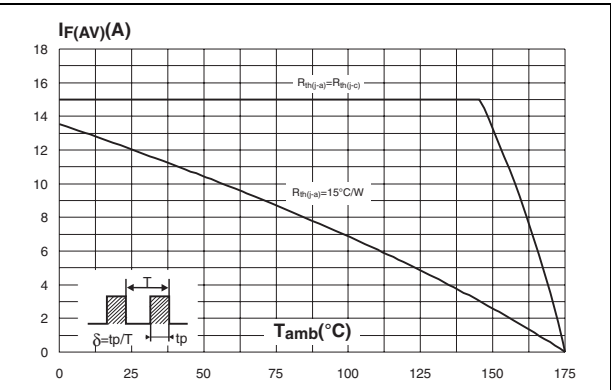
To evaluate the maximum conduction losses use the following equation :

$$P = 0.59 \times I_{F(AV)} + 0.01 I_{F(RMS)}^2$$

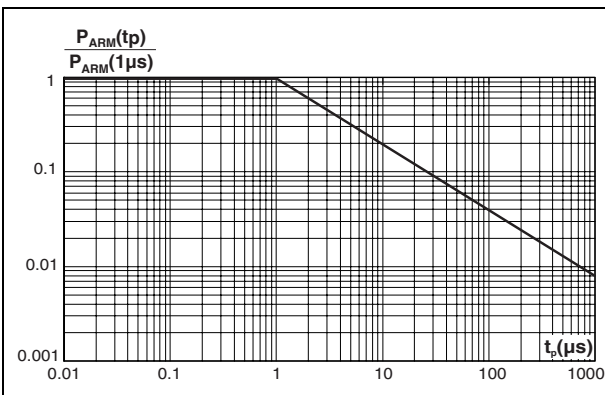
**Figure 2. Average forward power dissipation versus average forward current (per diode)**



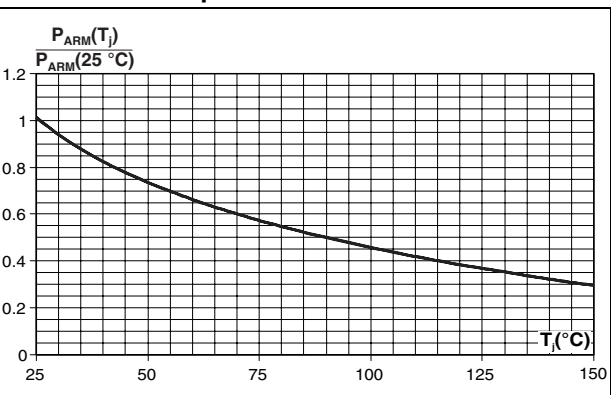
**Figure 3. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



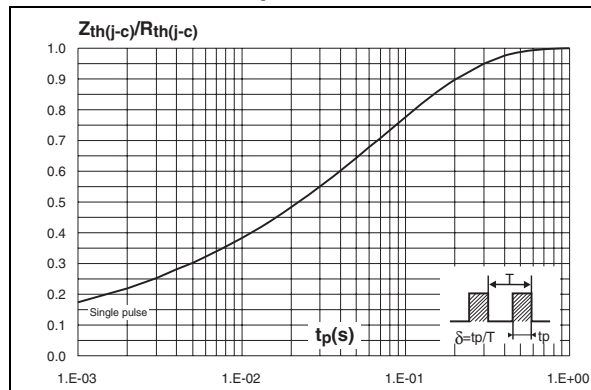
**Figure 4. Normalized avalanche power derating versus pulse duration**



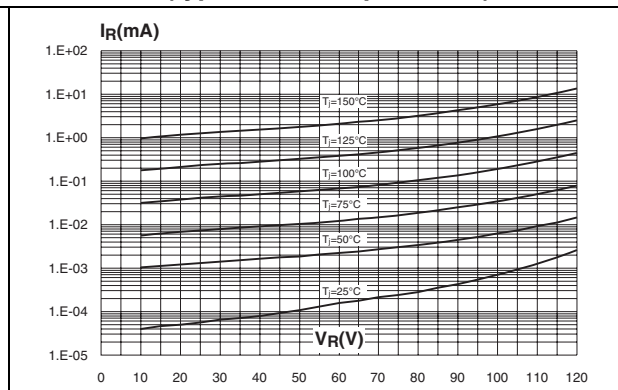
**Figure 5. Normalized avalanche power derating versus junction temperature**



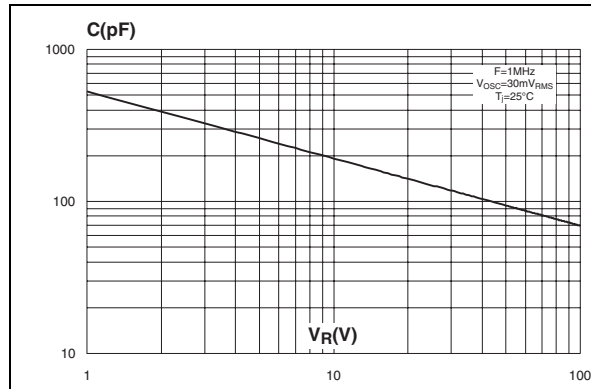
**Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration**



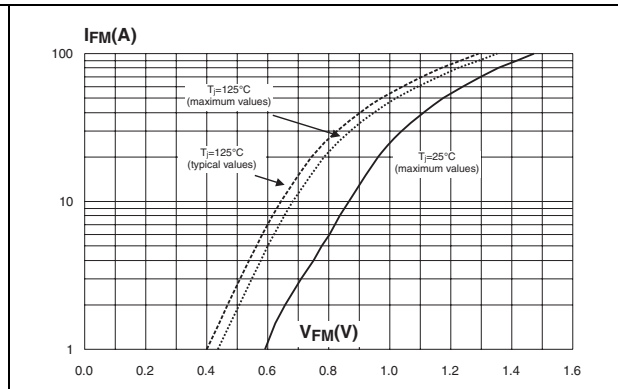
**Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



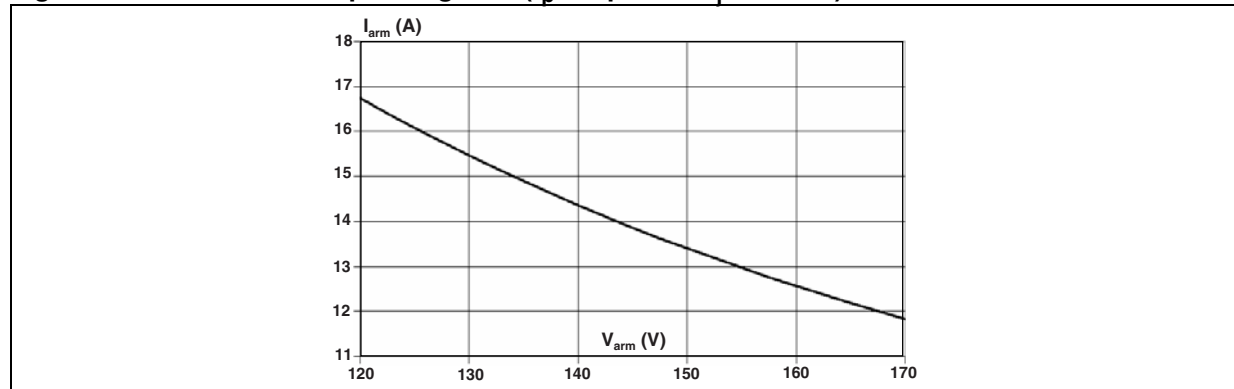
**Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 9. Forward voltage drop versus forward current (per diode)**



**Figure 10. Reverse safe operating area ( $t_p < 1 \mu s$  and  $T_j < 150^\circ C$ )**



## 2 Package information

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

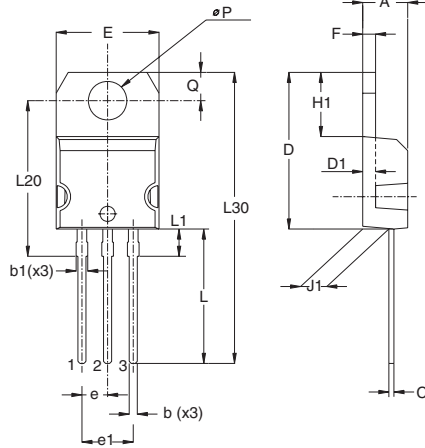
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**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. TO-220AB narrow leads dimensions

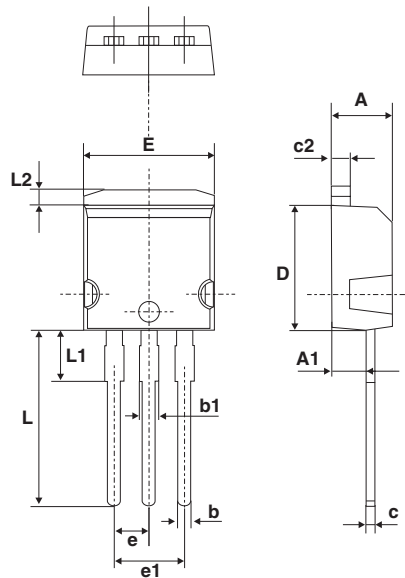
| Ref. | Dimensions  |      |       |        |      |       |
|------|-------------|------|-------|--------|------|-------|
|      | Millimeters |      |       | Inches |      |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ. | Max.  |
| A    | 4.40        |      | 4.60  | 0.17   |      | 0.18  |
| b    | 0.61        |      | 0.88  | 0.024  |      | 0.034 |
| b1   | 0.95        |      | 1.20  | 0.037  |      | 0.047 |
| c    | 0.48        |      | 0.70  | 0.019  |      | 0.027 |
| D    | 15.25       |      | 15.75 | 0.60   |      | 0.62  |
| D1   | 1.27        |      |       | 0.05   |      |       |
| E    | 10.00       |      | 10.40 | 0.39   |      | 0.41  |
| e    | 2.40        |      | 2.70  | 0.094  |      | 0.106 |
| e1   | 4.95        |      | 5.15  | 0.19   |      | 0.20  |
| F    | 1.23        |      | 1.32  | 0.048  |      | 0.052 |
| H1   | 6.20        |      | 6.60  | 0.24   |      | 0.26  |
| J1   | 2.40        |      | 2.72  | 0.095  |      | 0.107 |
| L    | 13.00       |      | 14.00 | 0.51   |      | 0.55  |
| L1   | 2.60        |      | 2.90  | 0.102  |      | 0.114 |
| L20  | 15.40       |      |       | 0.61   |      |       |
| L30  | 28.90       |      |       | 1.14   |      |       |
| ØP   | 3.75        |      | 3.85  | 0.147  |      | 0.151 |
| Q    | 2.65        |      | 2.95  | 0.104  |      | 0.116 |



Devices in I<sup>2</sup>PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

**Table 7. I<sup>2</sup>PAK 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 |



### 3 Ordering information

**Table 8. Ordering information**

| Order code   | Marking      | Package                  | Weight | Base qty | Delivery mode |
|--------------|--------------|--------------------------|--------|----------|---------------|
| STPS30120CT  | STPS30120CT  | TO-220AB                 | 2.23 g | 50       | Tube          |
| STPS30120CR  | STPS30120CR  | I <sup>2</sup> PAK       | 1.49 g | 50       | Tube          |
| STPS30120CTN | STPS30120CTN | TO-220AB<br>narrow leads | 1.9 g  | 50       | Tube          |

### 4 Revision history

**Table 9. Document revision history**

| Date        | Revision | Changes                                                                                          |
|-------------|----------|--------------------------------------------------------------------------------------------------|
| 18-Feb-2005 | 1        | First issue.                                                                                     |
| 23-Nov-2006 | 2        | Reformatted to current standards. Added I <sup>2</sup> PAK package.                              |
| 17-Feb-2010 | 3        | Updated <a href="#">Table 2</a> . Added <a href="#">Figure 1</a> and <a href="#">Figure 10</a> . |
| 13-Jan-2012 | 4        | Added TO-220AB narrow leads package.                                                             |

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