

### Description

Dual center tap Schottky rectifiers suited for switched mode power supplies and high frequency DC to DC converters.

Packaged in TO-220AB, TO-220AB narrow leads, I<sup>2</sup>PAK and D<sup>2</sup>PAK, this device is intended for use in high frequency inverters.

**Table 1. Device summary**

|             |          |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 10 A |
| $V_{RRM}$   | 60 V     |
| $T_j(max)$  | 150 °C   |
| $V_F(max)$  | 0.56 V   |

### Features

- Low forward voltage drop
- Negligible switching losses
- Low thermal resistance
- Avalanche capability specified

# 1 Characteristics

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

| Symbol              | Parameter   |                                    | Value                   | Unit     |   |
|---------------------|---|------------------------------------|-------------------------|----------|---|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                    | 60                      | V        |   |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                    | 30                      | A        |   |
| I <sub>F(AV)</sub>  | Average forward current                               | T <sub>C</sub> = 140 °C<br>δ = 0.5 | Per diode<br>Per device | 10<br>20 | A |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | t <sub>p</sub> = 10 ms             | Sinusoidal              | 220      | A |
| I <sub>RRM</sub>    | Repetitive peak reverse current                       | t <sub>p</sub> = 2 μs square       | F=1 kHz                 | 1        | A |
| P <sub>ARM</sub>    | Repetitive peak avalanche power                       | t <sub>p</sub> = 1 μs              | T <sub>j</sub> = 25 °C  | 5800     | W |
| T <sub>stg</sub>    | Storage temperature range                             |                                    | -65 to + 175            | °C       |   |
| T <sub>j</sub>      | Maximum operating junction temperature <sup>(1)</sup> |                                    | 150                     | °C       |   |
| dV/dt               | Critical rate of rise reverse voltage                 |                                    | 10000                   | V/μs     |   |

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

**Table 3. Thermal resistances**

| Symbol               | Parameter        |                    | Value       | Unit  |
|----------------------|------------------|--------------------|-------------|-------|
| R <sub>th(j-c)</sub> | Junction to case | Per diode<br>Total | 1.6<br>0.85 | ° C/W |
| R <sub>th(c)</sub>   | Coupling         |                    | 0.1         | ° C/W |

When the diodes 1 and 2 are used simultaneously:

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

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

| Symbol                        | Parameter               | Tests conditions        |                                   | Min. | Typ. | Max. | Unit |
|-------------------------------|-------------------------|-------------------------|-----------------------------------|------|------|------|------|
| I <sub>R</sub> <sup>(1)</sup> | Reverse leakage current | T <sub>j</sub> = 25 °C  | V <sub>R</sub> = V <sub>RRM</sub> |      |      | 350  | μA   |
|                               |                         | T <sub>j</sub> = 125 °C |                                   |      | 65   | 95   | mA   |
| V <sub>F</sub> <sup>(1)</sup> | Forward voltage drop    | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 10 A             |      |      | 0.6  | V    |
|                               |                         | T <sub>j</sub> = 125 °C | I <sub>F</sub> = 10 A             |      | 0.48 | 0.56 |      |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 20A              |      |      | 0.74 |      |
|                               |                         | T <sub>j</sub> = 125 °C | I <sub>F</sub> = 20A              |      | 0.62 | 0.7  |      |

1. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.014 \times I_{F(RMS)}^2$$

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

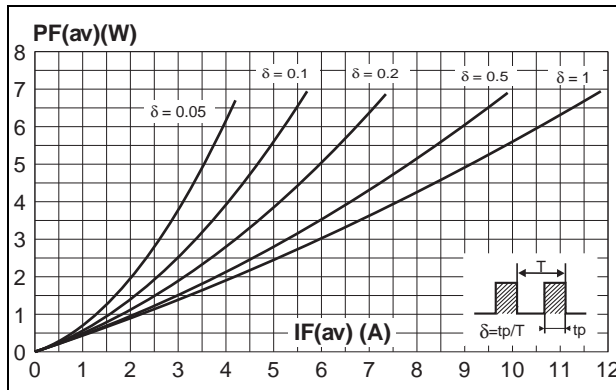


Figure 2. Average current versus ambient temperature ( $\delta = 0.5$ ) (per diode)

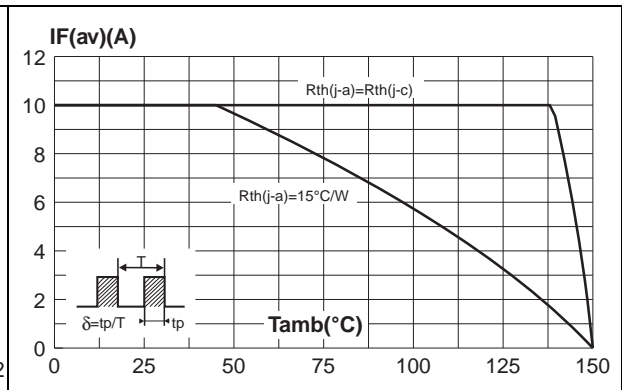


Figure 3. Normalized avalanche power derating versus pulse duration

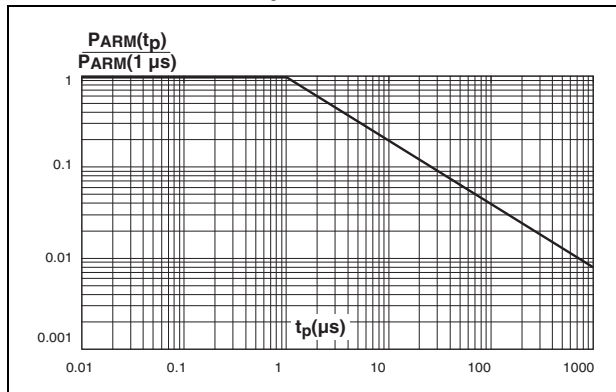


Figure 4. Normalized avalanche power derating versus junction temperature

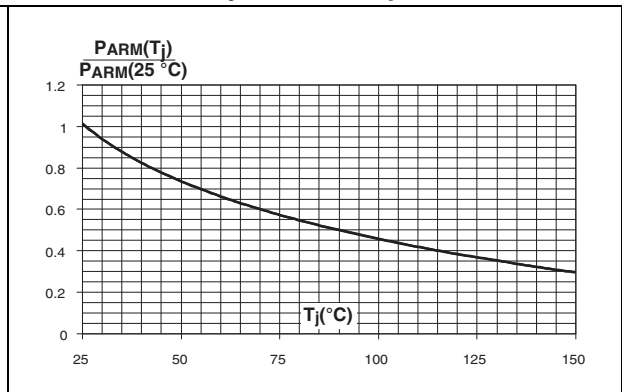


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

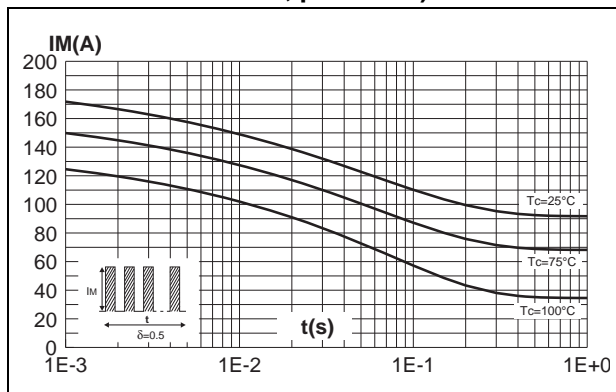


Figure 6. Relative variation of thermal transient impedance junction to case versus pulse duration

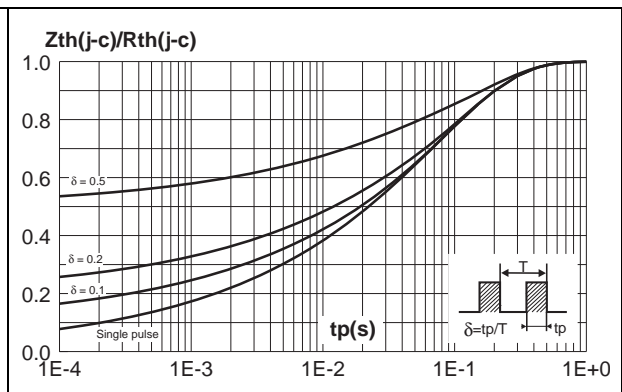


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

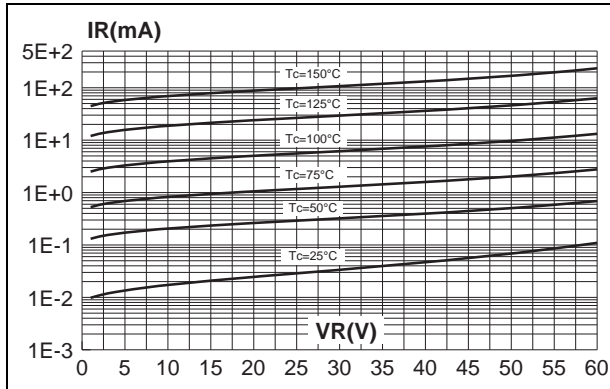


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

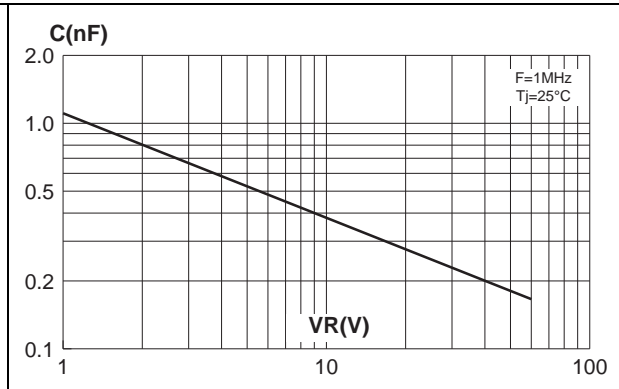
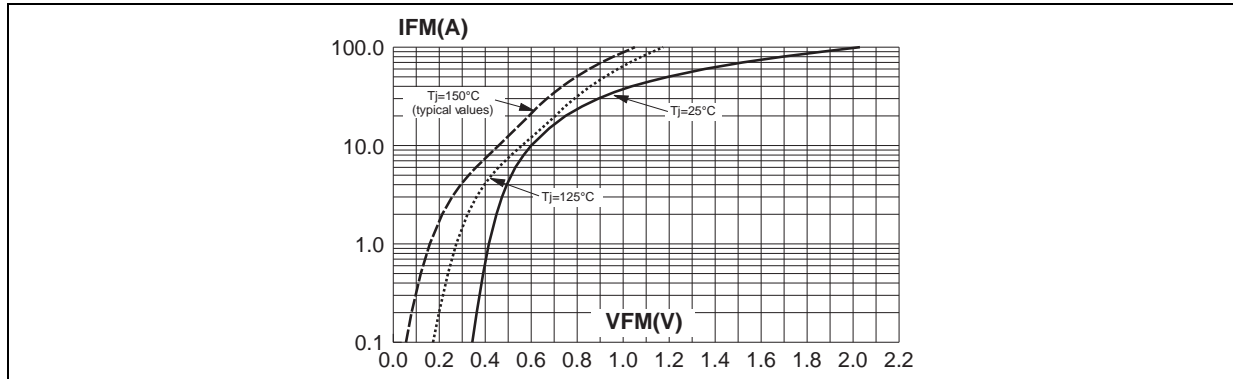


Figure 9. Forward voltage drop versus forward current (maximum values, per diode)



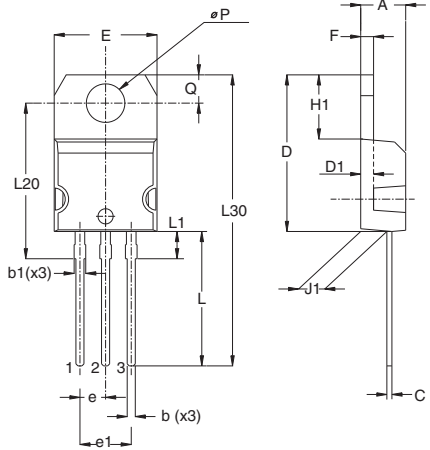
## 2 Package information

- Epoxy meets UL94,V0
- Cooling method: conduction
- 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 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   |      |       |
| ∅P   | 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 6. 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 |

Table 7. D<sup>2</sup>PAK 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 |
| A2   | 0.03        | 0.23  | 0.001      | 0.009 |
| B    | 0.70        | 0.93  | 0.027      | 0.037 |
| B2   | 1.14        | 1.70  | 0.045      | 0.067 |
| C    | 0.45        | 0.60  | 0.017      | 0.024 |
| C2   | 1.23        | 1.36  | 0.048      | 0.054 |
| D    | 8.95        | 9.35  | 0.352      | 0.368 |
| E    | 10.00       | 10.40 | 0.393      | 0.409 |
| G    | 4.88        | 5.28  | 0.192      | 0.208 |
| L    | 15.00       | 15.85 | 0.590      | 0.624 |
| L2   | 1.27        | 1.40  | 0.050      | 0.055 |
| L3   | 1.40        | 1.75  | 0.055      | 0.069 |
| M    | 2.40        | 3.20  | 0.094      | 0.126 |
| R    | 0.40 typ.   |       | 0.016 typ. |       |
| V2   | 0°          | 8°    | 0°         | 8°    |

\* FLAT ZONE NO LESSTHAN 2mm

Figure 10. Footprint (dimensions in mm)

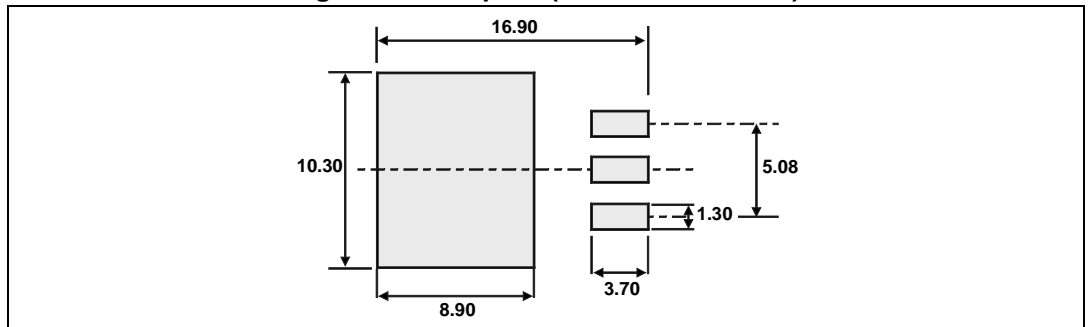
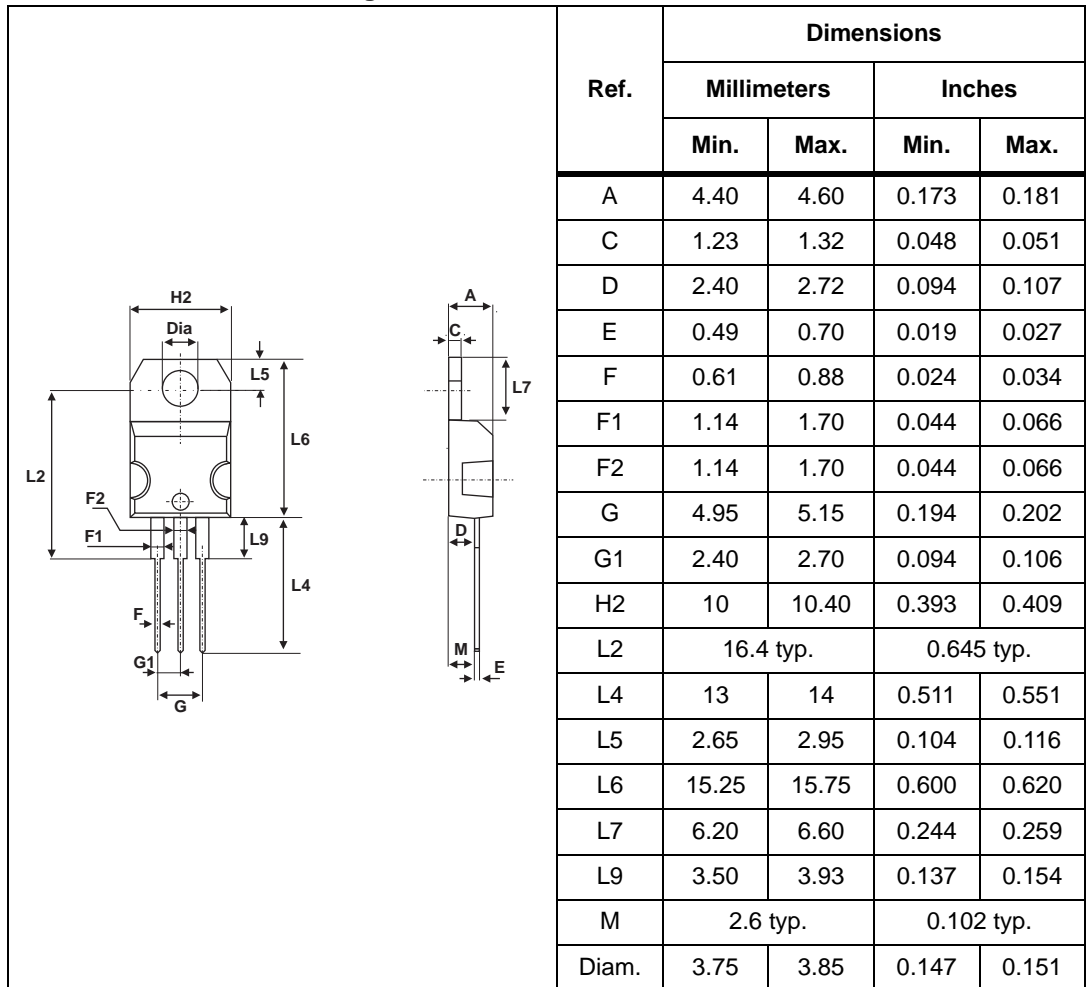


Figure 11. TO-220AB dimensions





### 3 Ordering information

**Table 8. Ordering information**

| Type           | Marking      | Package                  | Weight | Base qty | Delivery mode |
|----------------|--------------|--------------------------|--------|----------|---------------|
| STPS20L60CT    | STPS20L60CT  | TO-220AB                 | 2.2 g  | 50       | Tube          |
| STPS20L60CT    | STPS20L60CT  | TO-220AB                 | 2.2 g  | 1000     | Bulk          |
| STPS20L60CG    | STPS20L60CG  | D <sup>2</sup> PAK       | 1.48 g | 50       | Tube          |
| STPS20L60CG-TR | STPS20L60CG  | D <sup>2</sup> PAK       | 1.48 g | 1000     | Tape and reel |
| STPS20L60CR    | STPS20L60CR  | I <sup>2</sup> PAK       | 1.49 g | 50       | Tube          |
| STPS20L60CTN   | STPS20L60CTN | TO-220AB<br>narrow leads | 1.9 g  | 50       | Tube          |

### 4 Revision history

**Table 9. Document revision history**

| Date        | Revision | Changes                              |
|-------------|----------|--------------------------------------|
| Jul-2003    | 3C       | Previous release                     |
| 02-Aug-2013 | 4        | Added TO-220AB narrow leads package. |

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