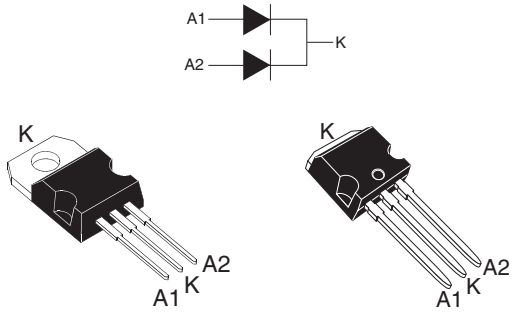
# STPS40120C



## Power Schottky rectifier

## Main product characteristics

| | |
|---|---|
| $I_{F(AV)}$ | 2 x 20 A |
| $V_{RRM}$ | 120 V |
| $T_{j(max)}$ | 175° C |
| $V_{F(typ)}$ | 0.57 V |




**TO-220AB**
**STPS40120CT**

**$I^2PAK$**
**STPS40120CR**

## 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 and $I^2PAK$, 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 |
|---|---|
| STPS40120CT | STPS40120CT |
| STPS40120CR | STPS40120CR |

**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 voltage | | | 30 | A |
| $I_{F(AV)}$ | Average forward current | $\delta = 0.5$<br>$Tc = 145°$ C | Per diode<br>Per device | 20<br>40 | A |
| $I_{FSM}$ | Surge non repetitive forward current | | $t_p = 10$ ms Sinusoidal | 200 | A |
| $P_{ARM}$ | Repetitive peak avalanche power | | $t_p = 1$ µs $T_j = 25°$ C | 10500 | W |
| $T_{stg}$ | Storage temperature range | | | -65 to + 175 | ° C |
| $T_j$ | Maximum operating junction temperature(1) | | | 175 | ° C |

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid 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 | Per diode<br>Total | 1.6<br>0.85 | ° C/W |
| $R_{th(c)}$ | Coupling | Total | 0.1 | ° C/W |

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

**Table 3. Static electrical characteristics (per diode)**

| Symbol | Test conditions | | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$(1) | Reverse leakage current | $T_j$ = 25° C | $V_R = V_{RRM}$ | | | 25 | µA |
| | | $T_j$ = 125° C | | | 4 | 12 | mA |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25° C | $I_F$ = 7.5 A | | | 0.73 | V |
| | | $T_j$ = 125° C | | | 0.57 | 0.61 | |
| | | $T_j$ = 25° C | $I_F$ = 20A | | | 0.9 | |
| | | $T_j$ = 125° C | | | 0.69 | 0.73 | |
| | | $T_j$ = 25° C | $I_F$ = 40 A | | | 1 | |
| | | $T_j$ = 125° C | | | 0.83 | 0.88 | |

1. Pulse test : tp = 5 ms, $\delta$ < 2%
2. Pulse test : tp = 380 µs, $\delta$ < 2%

To evaluate the maximum conduction losses use the following equation :
$P = 0.58 \times I_{F(AV)} + 0.0075\ I_F{}^2{}_{(RMS)}$

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

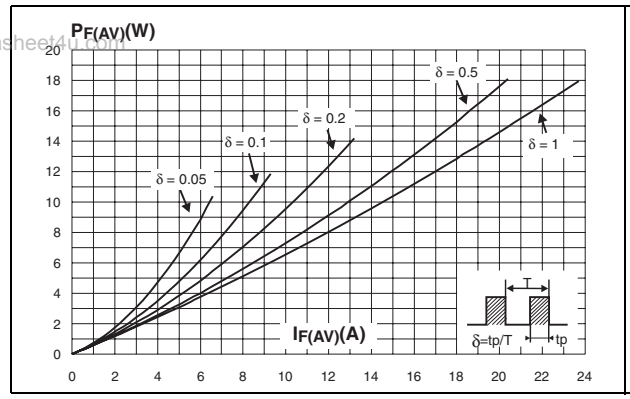



**Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)**

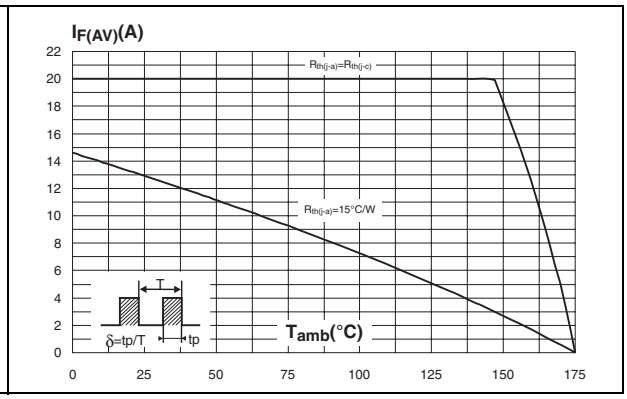



**Figure 3. Normalized avalanche power derating versus pulse duration**

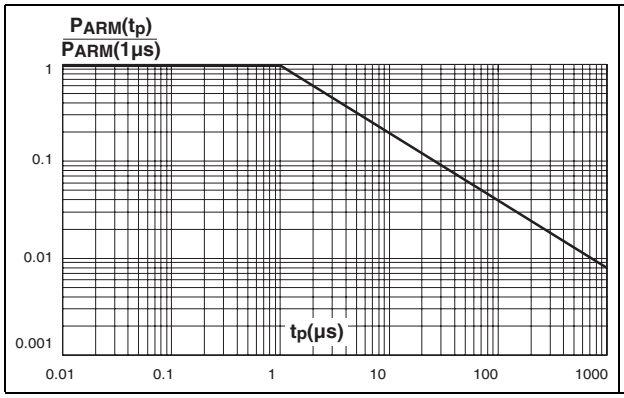



**Figure 4. Normalized avalanche power derating versus junction temperature**

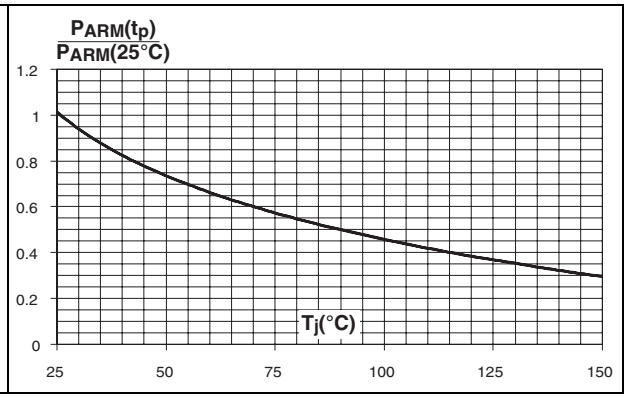



**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)**

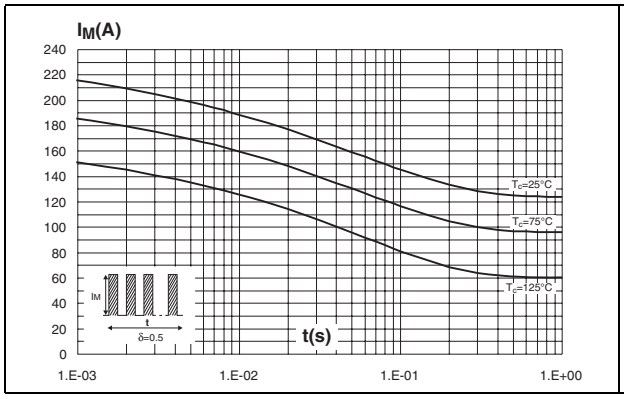



**Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration**

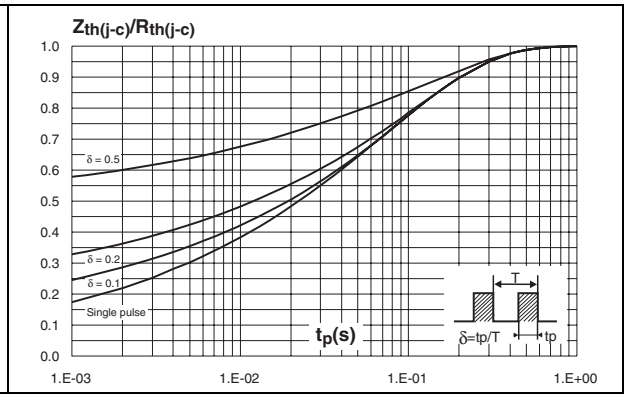


**Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)**

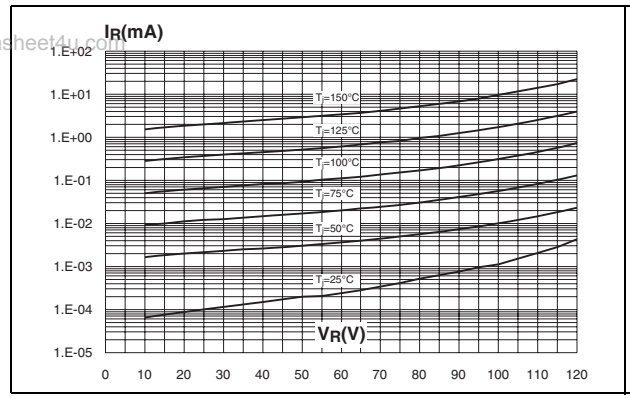



**Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)**

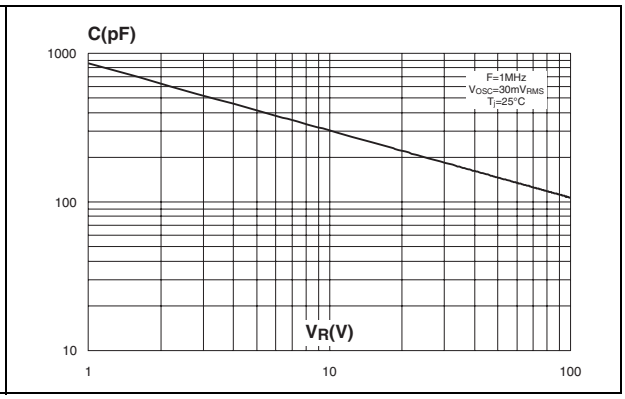
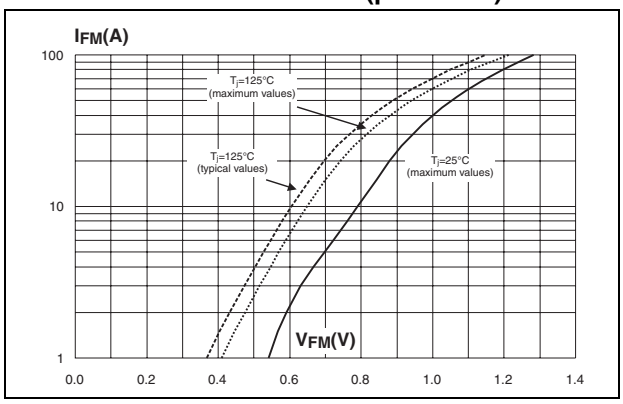



**Figure 9. Forward voltage drop versus forward current (per diode)**

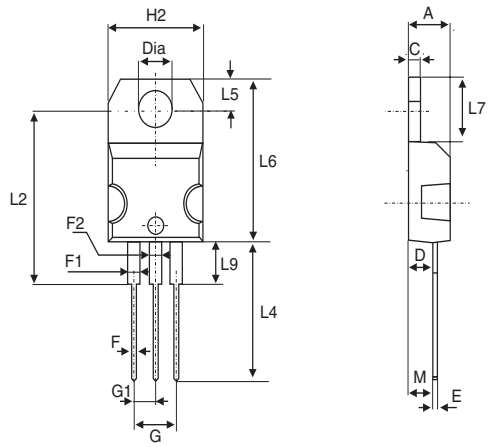


# 2 Package information



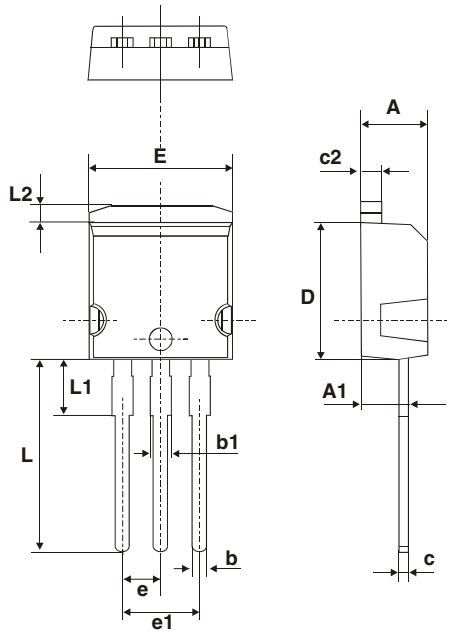
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 Nm
- Maximum torque value: 1.0 Nm

**Figure 10. 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 4. $I^2PAK$ 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 |

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# 3 Ordering information



| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STPS40120CT | STPS40120CT | TO-220AB | 2.23 g | 50 | Tube |
| STPS40120CR | STPS40120CR | $I^2PAK$ | 1.49 g | 50 | Tube |

# 4 Revision history

| Date | Revision | Description of Changes |
|---|---|---|
| 18-Feb-2005 | 1 | First issue |
| 1-Dec-2006 | 2 | Reformatted to current standards. Added $I^2PAK$. |

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