

Features

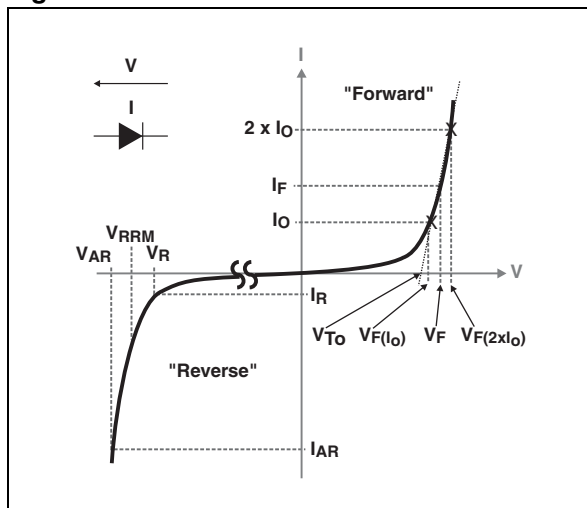
- Low forward voltage drop
- Negligible switching losses
- Low thermal resistance
- Avalanche capability specified

Description

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

Packaged in TO-220FPAB, TO-220AB narrow leads, TO-220AB, D²PAK, I²PAK and TO-247, this device is intended for use in high frequency inverters.

Figure 1. Electrical characteristics (a)



- a. V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in [Figure 12](#). 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

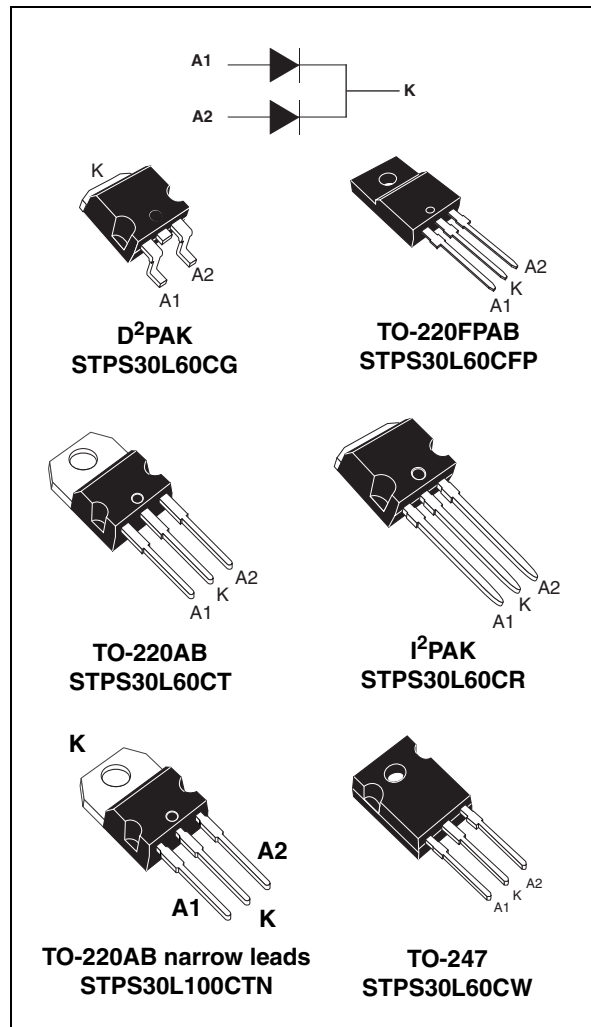


Table 1. Device summary

| Symbol | Value |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 15 A |
| V_{RRM} | 60 V |
| $T_J(max)$ | 150 °C |
| $V_F(max)$ | 0.56 V |

1 Characteristics

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

| Symbol | Parameter | | | Value | Unit | |
|---------------------------------|---|--|---|-------------------------|----------|---|
| V _{RRM} | Repetitive peak reverse voltage | | | 60 | V | |
| I _{F(RMS)} | Forward rms current | | | 30 | A | |
| I _{F(AV)} | Average forward current | TO-220AB narrow leads, TO-220AB, I ² PAK, D ² PAK, TO-247, δ = 0.5 | T _c = 130 °C | Per diode Per device | 15 30 | A |
| | | TO-220FPAB, δ = 0.5 | T _c = 110 °C | Per diode Per device | 15 30 | |
| I _{FSM} | Surge non repetitive forward current | | t _p = 10 ms, sinusoidal | | 230 | A |
| I _{RRM} | Repetitive peak reverse current | | t _p = 2 μs square, F = 1 kHz | | 2 | A |
| P _{ARM} ⁽¹⁾ | Repetitive peak avalanche power | | t _p = 1 μs, T _j = 25 °C | | 7800 | W |
| V _{ARM} ⁽²⁾ | Maximum repetitive peak avalanche voltage | | t _p < 1 μs, T _j < 150 °C, I _{AR} < 29 A | | 80 | V |
| V _{ASM} ⁽²⁾ | Maximum single pulse peak avalanche voltage | | t _p < 1 μs, T _j < 150 °C, I _{AR} < 29 A | | 80 | V |
| T _{stg} | Storage temperature range | | | -65 to + 175 | °C | |
| T _j | Maximum operating junction temperature ⁽³⁾ | | | 150 | °C | |
| dV/dt | Critical rate of rise reverse voltage | | | 10000 | V/μs | |

1. For temperature or pulse time duration deratings, refer to [Figure 4](#) and [Figure 5](#). More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
2. Refer to [Figure 12](#).
3. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances

| Symbol | Parameter | | | Value | Unit |
|----------------------|------------------|--|-----------|-------|------|
| R _{th(j-c)} | Junction to case | TO-220AB narrow leads, TO-220AB, I ² PAK, D ² PAK, TO-247 | Per diode | 1.5 | °C/W |
| | | | Total | 0.8 | |
| | | TO-220FPAB | Per diode | 4.7 | |
| | | | Total | 3.95 | |
| R _{th(c)} | Coupling | TO-220AB narrow leads, TO-220AB, I ² PAK, D ² PAK, TO-247 | 0.1 | | |
| | | TO-220FPAB | 3.2 | | |

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 |
|-------------|-------------------------|-----------------------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^\circ\text{C}$ | $V_R = V_{RRM}$ | | | 480 | μA |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | 77 | 130 | mA |
| $V_F^{(1)}$ | Forward voltage drop | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ | | | 0.6 | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ | | 0.5 | 0.56 | |
| | | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 30\text{ A}$ | | | 0.75 | |
| | | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 30\text{ A}$ | | 0.65 | 0.7 | |

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

To evaluate the conduction losses use the following equation: $P = 0.42 \times I_{F(AV)} + 0.009 \times I_{F(RMS)}^2$

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

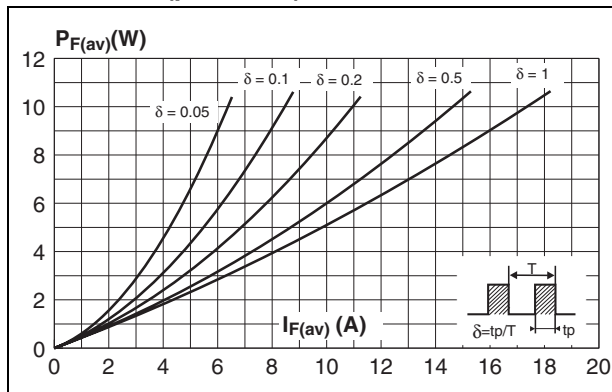


Figure 3. Average forward current versus ambient temperature (delta = 0.5, per diode)

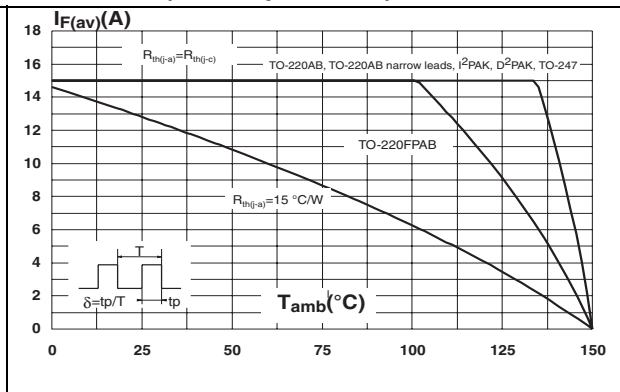


Figure 4. Normalized avalanche power derating versus pulse duration

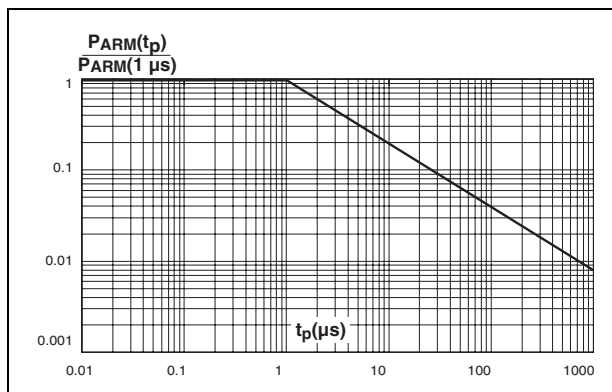


Figure 5. Normalized avalanche power derating versus junction temperature

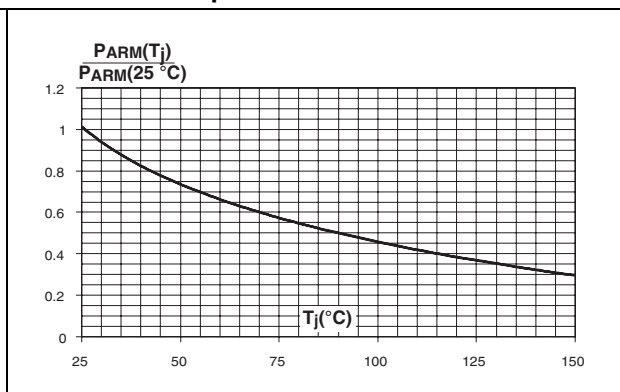


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

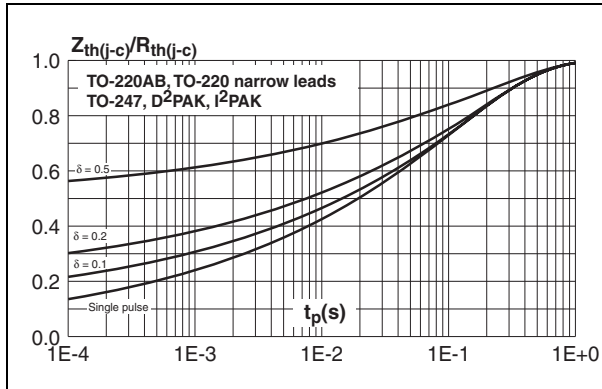


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

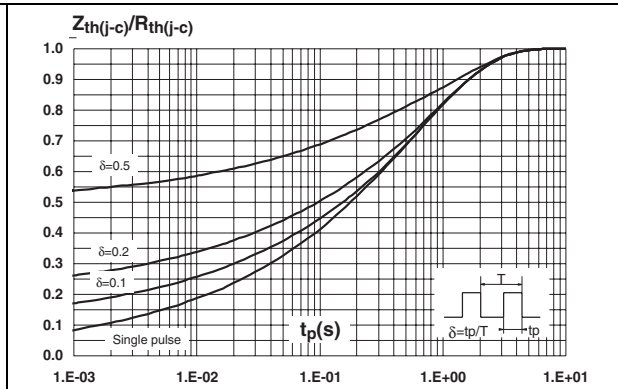


Figure 8. Reverse leakage current versus reverse voltage applied (typical values, per diode)

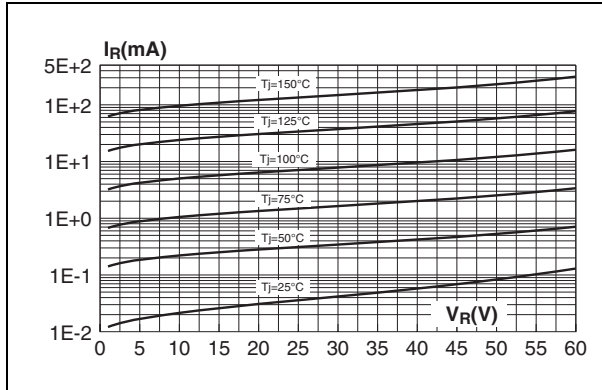


Figure 9. Junction capacitance versus reverse voltage applied (typical values, per diode)

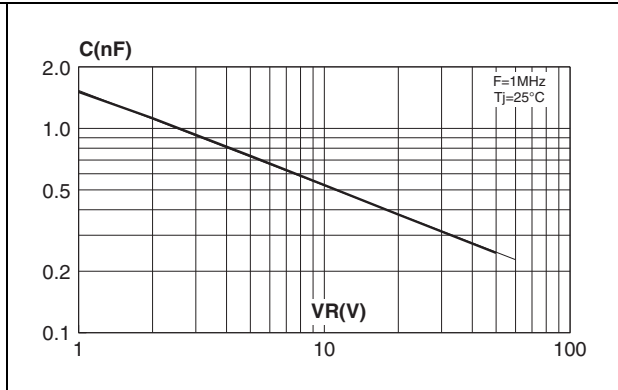


Figure 10. Forward voltage drop versus forward current (maximum values, per diode)

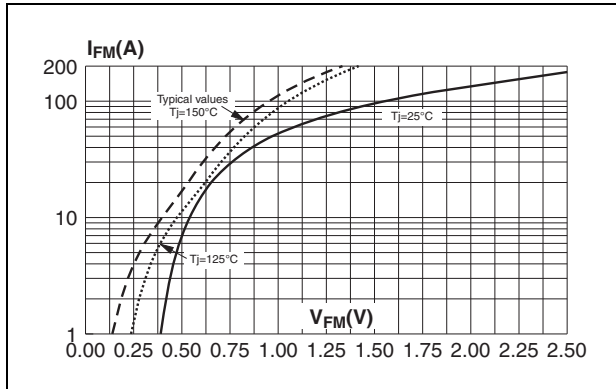


Figure 11. Thermal resistance junction to ambient versus copper surface under tab for D²PAK

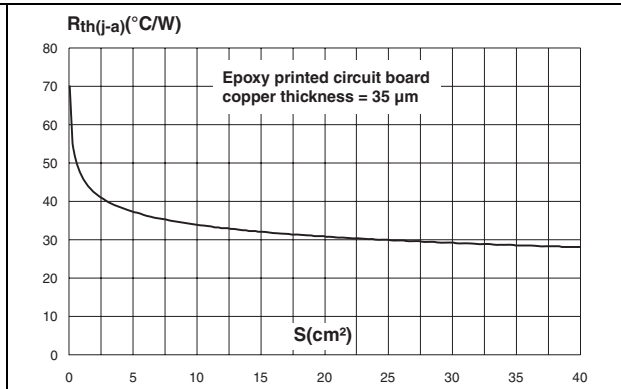
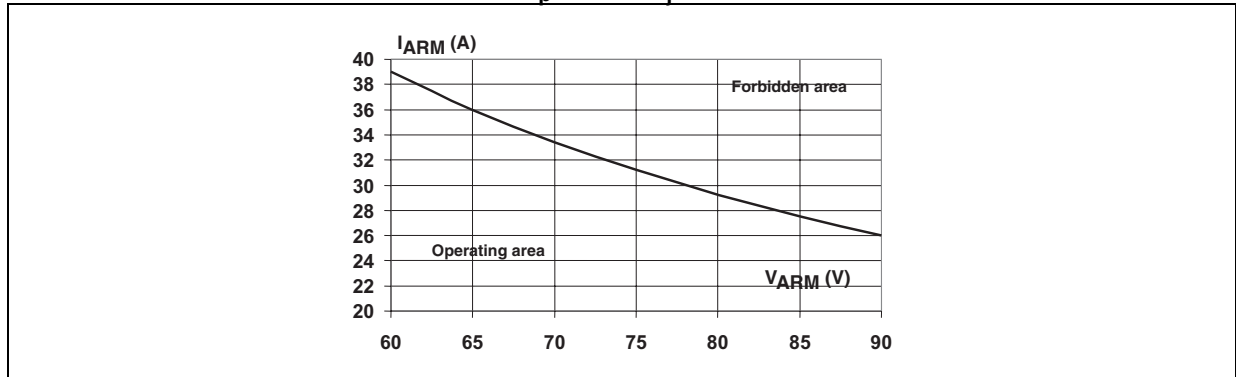


Figure 12. Reverse safe operating area ($t_p < 1\ \mu\text{s}$, $T_j < 150\ ^\circ\text{C}$)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque values: TO-220AB, TO-220AB narrow leads, and TO-220FPAB 0.4 to 0.6 N·m, TO-247 0.55 N·m (1.0 N·m maximum)

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

Table 5. 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 |

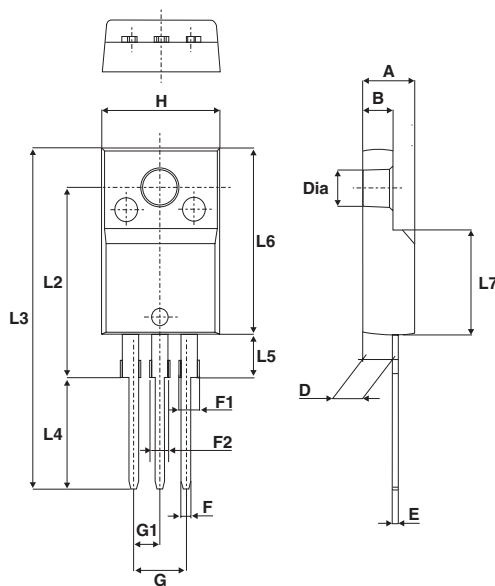


Table 6. TO-220AB dimensions

| 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 | 0.067 |
| F2 | 1.14 | 1.70 | 0.044 | 0.067 |
| 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 |

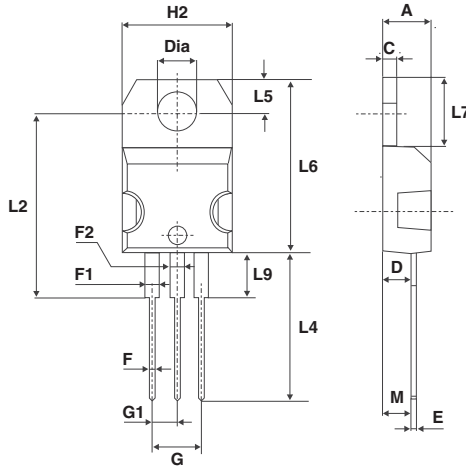
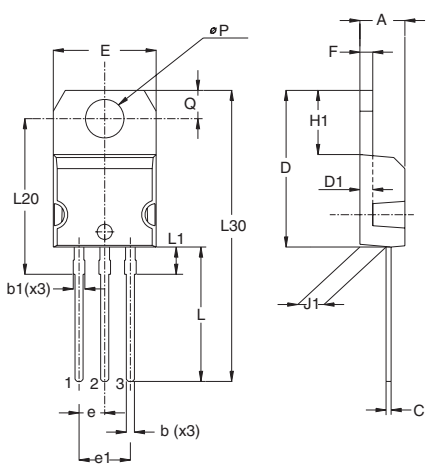


Table 7. TO-220AB narrow leads dimensions

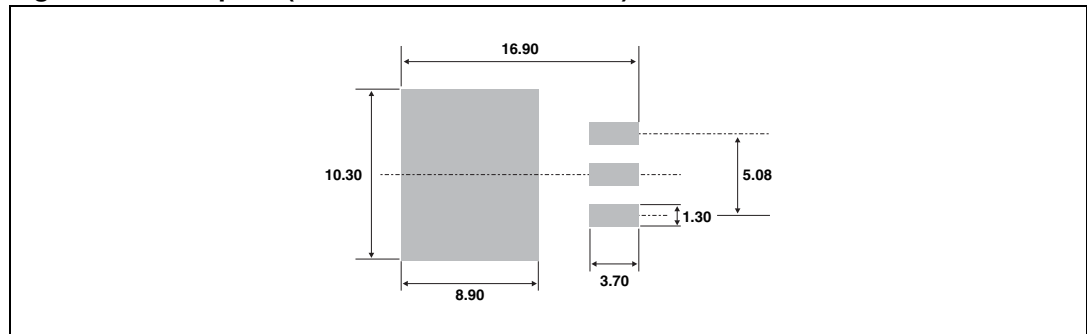


| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.40 | | 4.60 | 0.17 | | 0.18 |
| b | 0.61 | | 0.88 | 0.024 | | 0.034 |
| b1 | 0.95 | | 1.20 | 0.037 | | 0.047 |
| c | 0.48 | | 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 |

Table 8. D²PAK 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° |

Figure 13. Footprint (dimensions in millimeters)



Devices in I²PAK 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 9. I²PAK 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 |

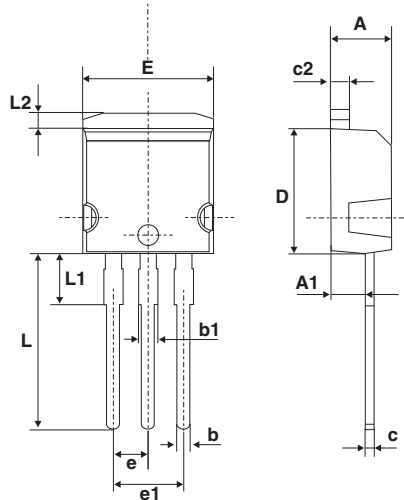
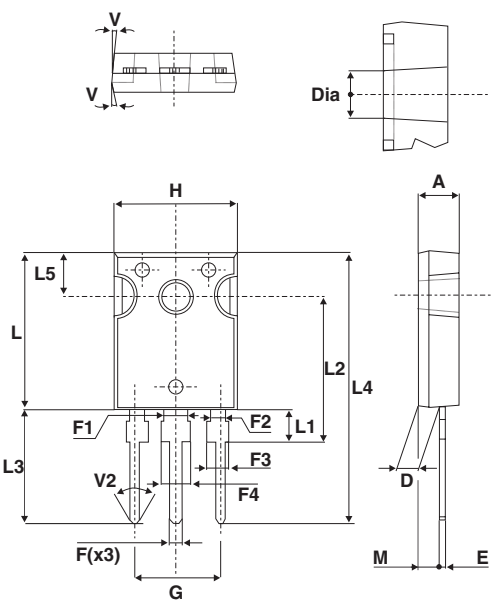


Table 10. TO-247 dimensions



| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.85 | | 5.15 | 0.191 | | 0.203 |
| D | 2.20 | | 2.60 | 0.086 | | 0.102 |
| E | 0.40 | | 0.80 | 0.015 | | 0.031 |
| F | 1.00 | | 1.40 | 0.039 | | 0.055 |
| F1 | | 3.00 | | | 0.118 | |
| F2 | | 2.00 | | | 0.078 | |
| F3 | 2.00 | | 2.40 | 0.078 | | 0.094 |
| F4 | 3.00 | | 3.40 | 0.118 | | 0.133 |
| G | | 10.90 | | | 0.429 | |
| H | 15.45 | | 15.75 | 0.608 | | 0.620 |
| L | 19.85 | | 20.15 | 0.781 | | 0.793 |
| L1 | 3.70 | | 4.30 | 0.145 | | 0.169 |
| L2 | | 18.50 | | | 0.728 | |
| L3 | 14.20 | | 14.80 | 0.559 | | 0.582 |
| L4 | | 34.60 | | | 1.362 | |
| L5 | | 5.50 | | | 0.216 | |
| M | 2.00 | | 3.00 | 0.078 | | 0.118 |
| V | | 5° | | | 5° | |
| V2 | | 60° | | | 60° | |
| Dia. | 3.55 | | 3.65 | 0.139 | | 0.143 |

3 Ordering information

Table 11. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|--------------|--------------------------|--------|----------|---------------|
| STPS30L60CW | STPS30L60CW | TO-247 | 4.4 g | 30 | Tube |
| STPS30L60CT | STPS30L60CT | TO-220AB | 2.3 g | 50 | Tube |
| STPS30L60CG | STPS30L60CG | D ² PAK | 1.5 g | 50 | Tube |
| STPS30L60CG-TR | STPS30L60CG | D ² PAK | 1.5 g | 1000 | Tape and reel |
| STPS30L60CR | STPS30L60CR | I ² PAK | 1.49 g | 50 | Tube |
| STPS30L60CFP | STPS30L60CFP | TO-220FPAB | 2.0 g | 50 | Tube |
| STPS30L60CTN | STPS30L60CTN | TO-220AB narrow leads | 1.9 g | 50 | Tube |

4 Revision history

Table 12. Document revision history

| Date | Revision | Description of changes |
|-------------|----------|--|
| July-2003 | 3B | Initial release |
| 16-Oct-2006 | 4 | Reformatted to current standards. Corrected dimensions for I ² PAK in Table 5. |
| 28-Nov-2006 | 5 | Added TO-220FPAB package. Added STPS30L60CG-TR to ordering information. |
| 07-Mar-2007 | 6 | Updated thermal parameters in Table 2. |
| 31-Mar-2007 | 7 | Updated T _C = 110 °C in Table 1. |
| 25-Aug-2008 | 8 | Reformatted to current standards. Updated ECOPACK statement. Updated torque values and dimension illustration for TO-247 in Section 2 . |
| 07-Feb-2011 | 9 | Added electrical diagram on first page. Added parameters V _{ARM} and V _{ASM} to Table 2 . Added Figure 12 . Updated and added warning paragraph above Table 9 . Updated Table 11 . |
| 15-Jun-2012 | 10 | Added TO-220AB narrow leads package. |

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