

## HIGH EFFICIENCY ULTRAFAST DIODE

### MAIN PRODUCT CHARACTERISTICS

|                |        |
|----------------|--------|
| $I_{F(AV)}$    | 2 x 4A |
| $V_{RRM}$      | 200 V  |
| $T_j$ (max)    | 175 °C |
| $V_F$ (max)    | 0.95 V |
| $t_{rr}$ (max) | 20 ns  |

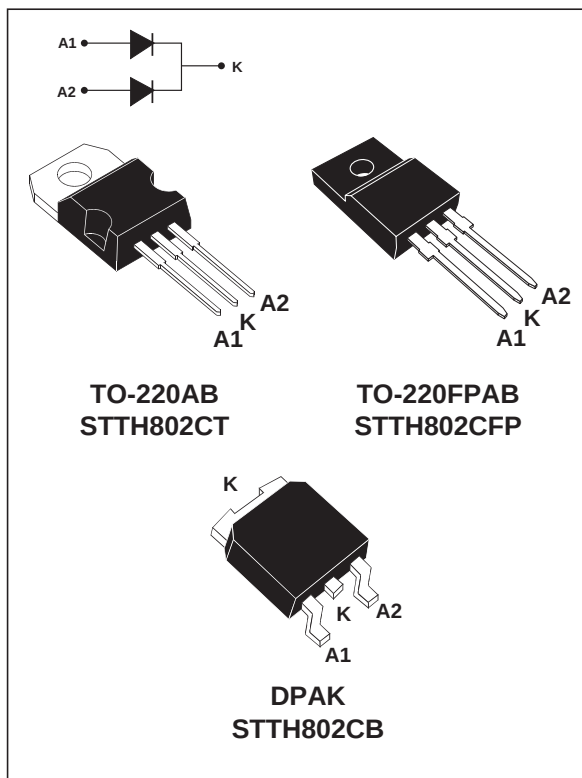
### FEATURES AND BENEFITS

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- High surge current capability
- High junction temperature
- Insulated package: TO-220FPAB

### DESCRIPTION

Dual center tap rectifier suited for Switch Mode Power Supplies and High frequency DC to DC converters.

Packaged in DPAK, TO-220AB or TO-220FPAB. This device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



### ABSOLUTE RATINGS (limiting values)

| Symbol       | Parameter                              |                              |                           |            | Value      | Unit |
|--------------|----------------------------------------|------------------------------|---------------------------|------------|------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                              |                           |            | 200        | V    |
| $I_{F(RMS)}$ | RMS forward current                    | TO-220AB / TO-220FPAB / DPAK |                           |            | 10         | A    |
| $I_{F(AV)}$  | Average forward current $\delta = 0.5$ | TO-220AB / DPAK              | $T_c = 155^\circ\text{C}$ | Per diode  | 4          | A    |
|              |                                        | TO-220FPAB                   | $T_c = 145^\circ\text{C}$ |            |            |      |
|              |                                        | TO-220AB / DPAK              | $T_c = 150^\circ\text{C}$ | Per device | 8          | A    |
|              |                                        | TO-220FPAB                   | $T_c = 130^\circ\text{C}$ |            |            |      |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10$ ms Sinusoidal     |                           |            | 50         | A    |
| $T_{stg}$    | Storage temperature range              |                              |                           |            | - 65 + 175 | °C   |
| $T_j$        | Maximum operating junction temperature |                              |                           |            | 175        | °C   |

## THERMAL PARAMETERS

| Symbol               | Parameter        |                 |           | Maximum | Unit |
|----------------------|------------------|-----------------|-----------|---------|------|
| R <sub>th(j-c)</sub> | Junction to case | TO-220AB / DPAK | Per diode | 4.0     | °C/W |
|                      |                  | TO-220FPAB      |           | 6.5     |      |
|                      |                  | TO-220AB / DPAK | Total     | 2.5     |      |
|                      |                  | TO-220FPAB      |           | 5       |      |
| R <sub>th(j-c)</sub> | Coupling         | TO-220AB / DPAK |           | 1       | °C/W |
|                      |                  | TO-220FPAB      |           | 3.5     |      |

When the diodes 1 and 2 are used simultaneously:

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

## STATIC ELECTRICAL CHARACTERISTICS

| Symbol     | Parameter               | Tests conditions            |                     | Min. | Typ. | Max. | Unit          |
|------------|-------------------------|-----------------------------|---------------------|------|------|------|---------------|
| $I_R^*$    | Reverse leakage current | $T_j = 25^{\circ}\text{C}$  | $V_R = V_{RRM}$     |      |      | 4    | $\mu\text{A}$ |
|            |                         | $T_j = 125^{\circ}\text{C}$ |                     |      | 2    | 40   |               |
| $V_F^{**}$ | Forward voltage drop    | $T_j = 25^{\circ}\text{C}$  | $I_F = 4 \text{ A}$ |      |      | 1.1  | V             |
|            |                         | $T_j = 125^{\circ}\text{C}$ | $I_F = 4 \text{ A}$ |      | 0.81 | 0.95 |               |
|            |                         | $T_j = 25^{\circ}\text{C}$  | $I_F = 8 \text{ A}$ |      |      | 1.25 |               |
|            |                         | $T_j = 125^{\circ}\text{C}$ | $I_F = 8 \text{ A}$ |      | 0.95 | 1.1  |               |

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

\*\*  $t_p = 380\mu\text{s}$ ,  $\delta < 2\%$

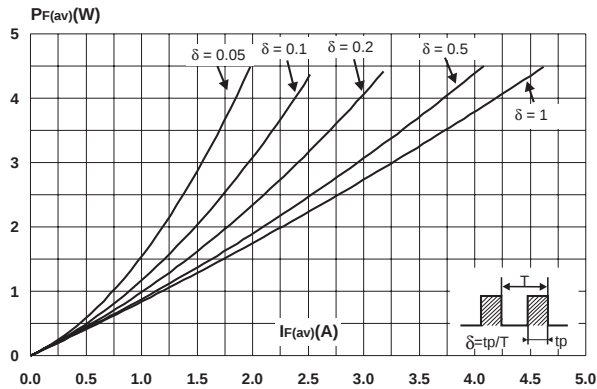
To evaluate the maximum conduction losses use the following equation :

$$P = 0.80 \times I_{F(AV)} + 0.037 I_F^2 (RMS)$$

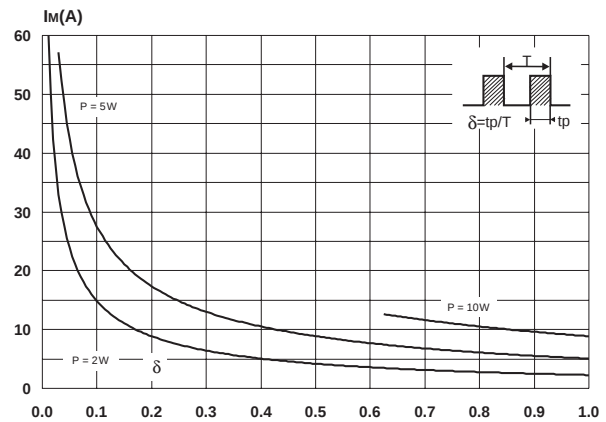
## DYNAMIC ELECTRICAL CHARACTERISTICS

| Symbol   | Parameter                | Tests conditions           |                                                                                             | Min. | Typ. | Max. | Unit |
|----------|--------------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|------|
| trr      | Reverse recovery time    | $T_j = 25^{\circ}\text{C}$ | $I_F = 0.5 \text{ A}$ $I_{rr} = 0.25 \text{ A}$<br>$I_R = 1 \text{ A}$                      |      | 13   | 20   | ns   |
| tfr      | Forward recovery time    | $T_j = 25^{\circ}\text{C}$ | $I_F = 4 \text{ A}$ $dI_F/dt = 100 \text{ A}/\mu\text{s}$<br>$V_{FR} = 1.1 \times V_{Fmax}$ |      | 50   |      | ns   |
| $V_{FP}$ | Forward recovery voltage | $T_j = 25^{\circ}\text{C}$ | $I_F = 4 \text{ A}$ $dI_F/dt = 100 \text{ A}/\mu\text{s}$                                   |      | 2.4  |      | V    |

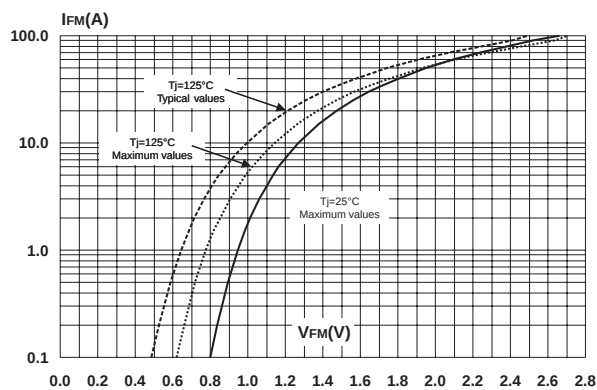
**Fig. 1:** Average forward power dissipation versus average forward current (per diode).



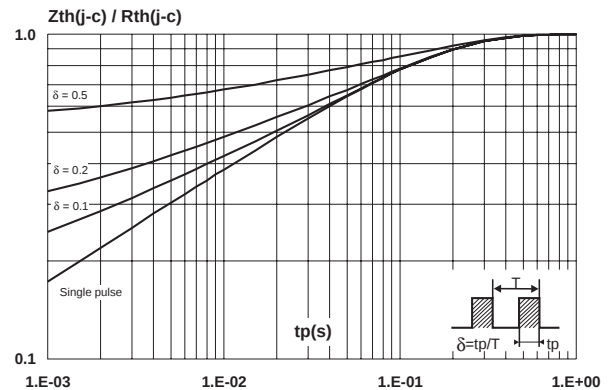
**Fig. 2:** Peak current versus form factor (per diode).



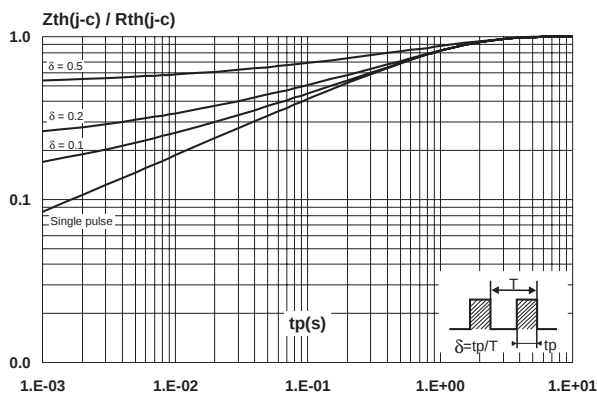
**Fig. 3:** Forward voltage drop versus forward current (per diode).



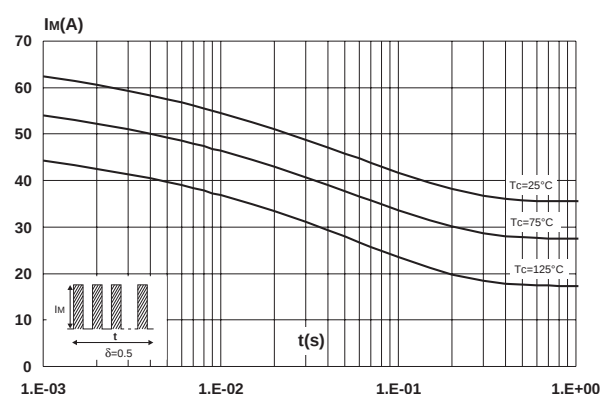
**Fig. 4-1:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, DPAK).



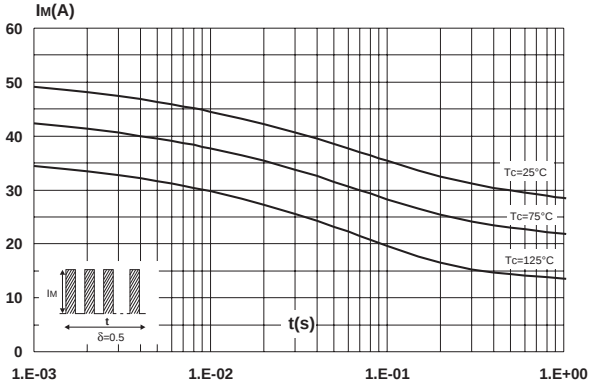
**Fig. 4-2:** Relative variation of thermal impedance junction to case versus duration (TO-220FPAB).



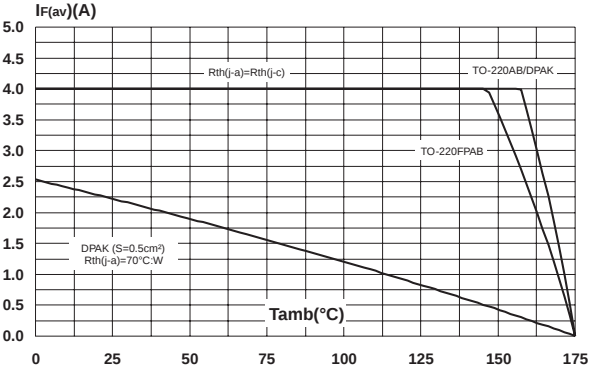
**Fig. 5-1:** Non repetitive surge peak forward current versus overload duration per diode (TO-220AB, DPAK).



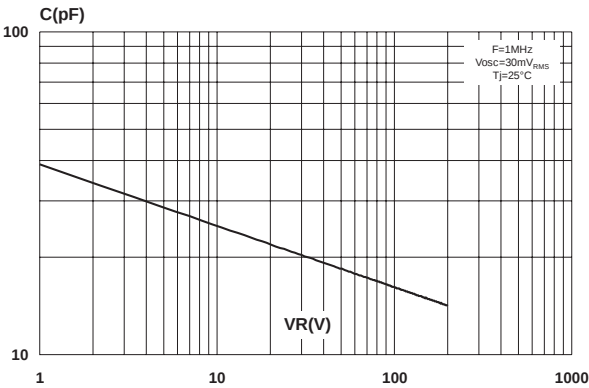
**Fig. 5-2:** Non repetitive surge peak forward current versus overload duration per diode (TO-220FPAB).



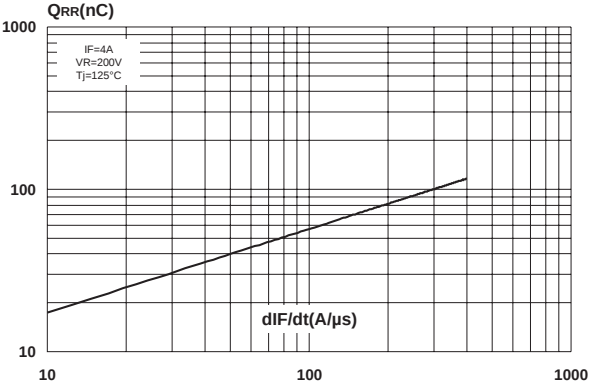
**Fig. 6:** Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode).



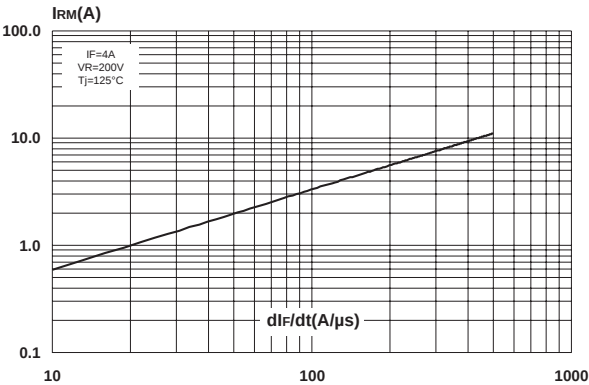
**Fig. 7:** Junction capacitance versus reverse voltage applied (typical values, per diode).



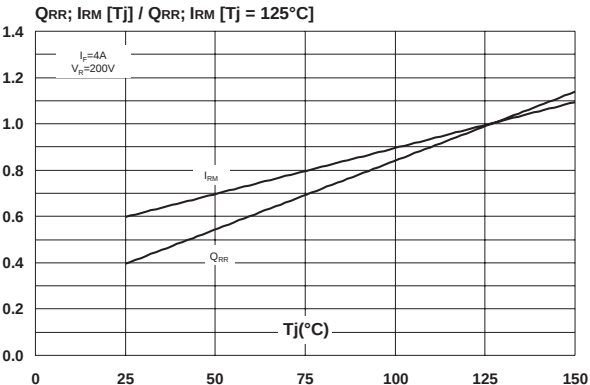
**Fig. 8:** Reverse recovery charges versus  $dI_F/dt$  (90% confidence, per diode).



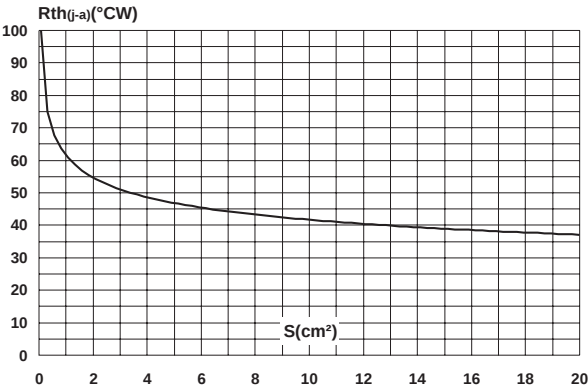
**Fig. 9:** Peak reverse recovery current versus  $dI_F/dt$  (90% confidence, per diode).



**Fig. 10:** Dynamic parameters versus junction temperature.



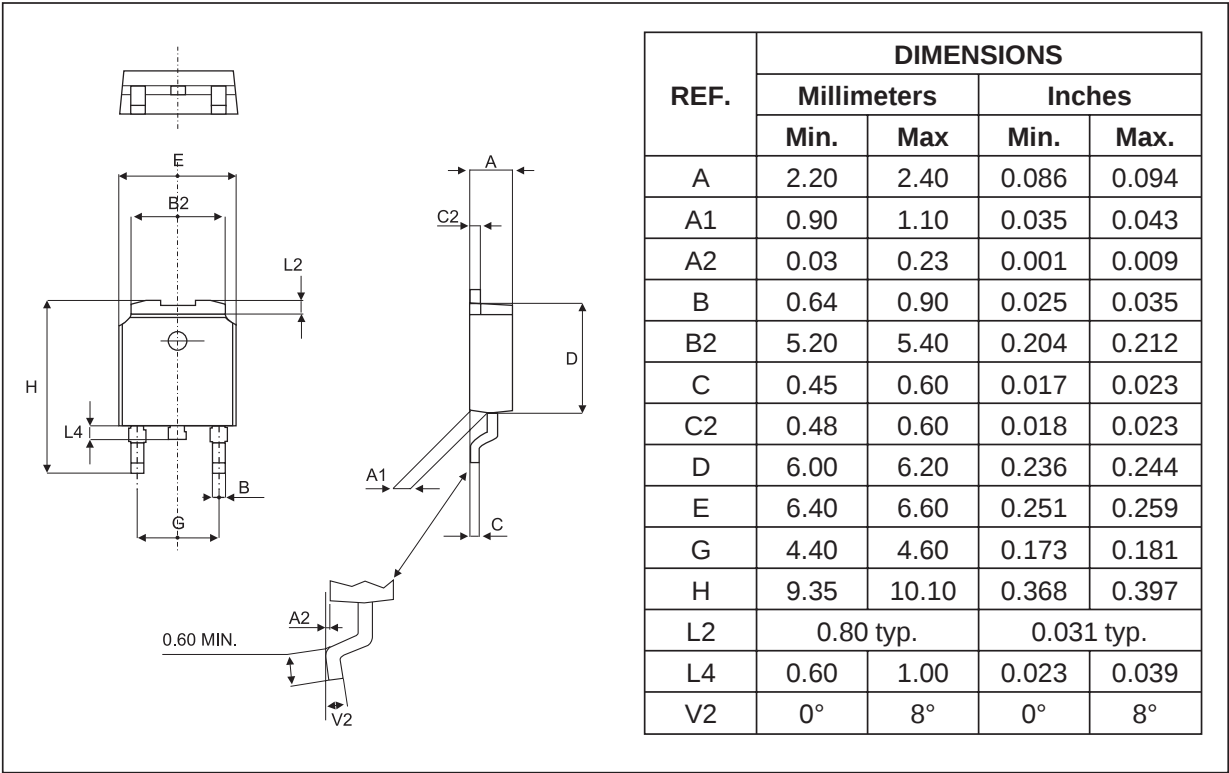
**Fig. 11:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35µm) for DPAK.



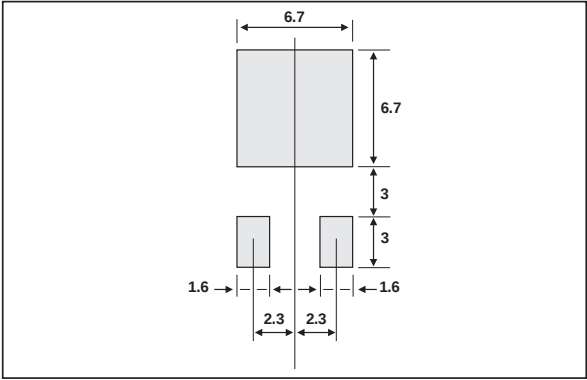
**PACKAGE MECHANICAL DATA**  
**TO-220AB**

| 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 |

PACKAGE MECHANICAL DATA  
DPAK



FOOTPRINT



**PACKAGE MECHANICAL DATA**  
**TO-220FPAB**

| 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 |

| Ordering code | Marking    | Package    | Weight | Base qty | Delivery mode |
|---------------|------------|------------|--------|----------|---------------|
| STTH802CT     | STTH802CT  | TO-220AB   | 2.23 g | 50       | Tube          |
| STTH802CB     | STTH802CB  | DPAK       | 0.3 g  | 75       | Tube          |
| STTH802CB-TR  | STTH802CB  | DPAK       | 0.3 g  | 2500     | Tape & reel   |
| STTH802CFP    | STTH802CFP | TO-220FPAB | 2.0 g  | 50       | Tube          |

- Cooling method: by conduction (method C)
- Recommended torque value (TO-220AB): 0.8 N.m
- Maximum torque value (TO-220AB): 1.0 N.m
- Recommended torque value (TO-220FPAB): 0.55 N.m
- Maximum torque value (TO-220FPAB): 0.7 N.m
- Epoxy meets UL 94,V0

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 2002 STMicroelectronics - Printed in Italy - All rights reserved.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany  
Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore  
Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>