

## HIGH EFFICIENCY ULTRAFAST DIODE

### MAIN PRODUCT CHARACTERISTICS

|                            |               |
|----------------------------|---------------|
| <b>I<sub>F(AV)</sub></b>   | <b>3A</b>     |
| <b>V<sub>RRM</sub></b>     | <b>200 V</b>  |
| <b>T<sub>j</sub> (max)</b> | <b>175 °C</b> |
| <b>V<sub>F</sub> (max)</b> | <b>0.75 V</b> |
| <b>trr (max)</b>           | <b>35 ns</b>  |

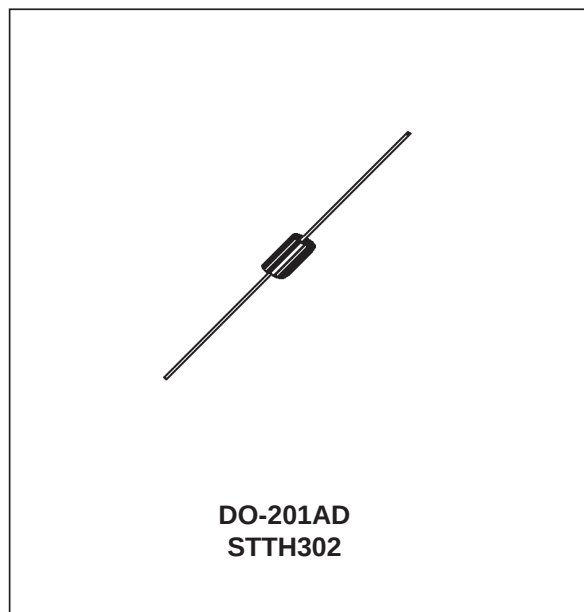
### FEATURES AND BENEFITS

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature

### DESCRIPTION

The STTH302 which is using ST's new 200V planar technology, is specially suited for switching mode base drive & transistor circuits.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.



### ABSOLUTE RATINGS (limiting values)

| Symbol              | Parameter                              |                                     | Value         | Unit |
|---------------------|----------------------------------------|-------------------------------------|---------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage        |                                     | 200           | V    |
| I <sub>F (AV)</sub> | Average forward current                | T <sub>I</sub> = 107°C    δ = 0.5   | 3             | A    |
| I <sub>FSM</sub>    | Surge non repetitive forward current   | t <sub>p</sub> = 10ms    Sinusoidal | 130           | A    |
| T <sub>stg</sub>    | Storage temperature range              |                                     | - 65 to + 175 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature |                                     | 175           | °C   |

### THERMAL PARAMETERS

| Symbol                | Parameter         | Value | Unit |
|-----------------------|-------------------|-------|------|
| R <sub>th (j-a)</sub> | Junction-ambient* | 25    | °C/W |

\* On infinite heatsink with 10mm lead length.

## STATIC ELECTRICAL CHARACTERISTICS

| Symbol     | Parameter               | Test Conditions           |                   | Min. | Typ. | Max. | Unit          |
|------------|-------------------------|---------------------------|-------------------|------|------|------|---------------|
| $I_R^*$    | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$   |      |      | 3    | $\mu\text{A}$ |
|            |                         | $T_j = 125^\circ\text{C}$ |                   |      | 4    | 75   |               |
| $V_F^{**}$ | Forward voltage drop    | $T_j = 25^\circ\text{C}$  | $I_F = 3\text{A}$ |      |      | 0.95 | V             |
|            |                         | $T_j = 125^\circ\text{C}$ |                   |      | 0.66 | 0.75 |               |

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

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

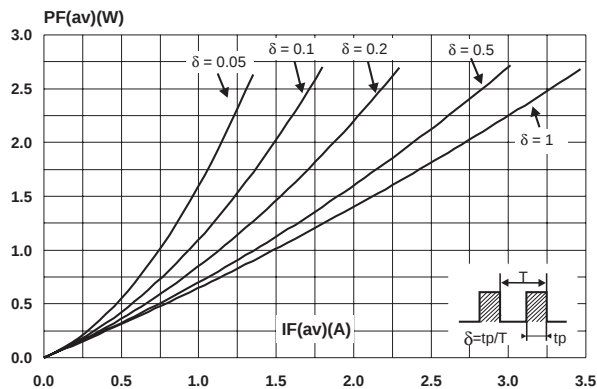
To evaluate the maximum conduction losses use the following equations:

$$P = 0.60 \times I_{F(AV)} + 0.05 I_F^2 (RMS)$$

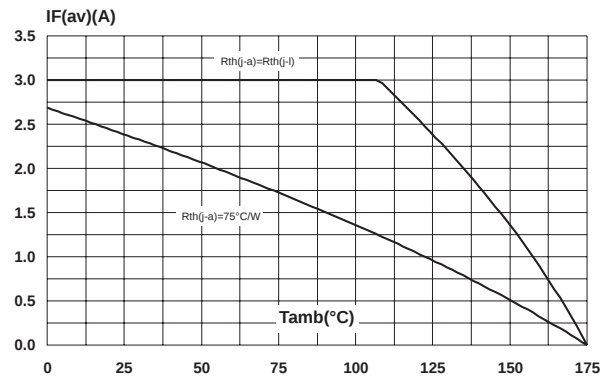
## DYNAMIC ELECTRICAL CHARACTERISTICS

| Symbol   | Parameter                | Test conditions                                                                               |                          | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------------------------------------------------------------------------------|--------------------------|------|------|------|------|
| trr      | Reverse recovery time    | $I_F = 1\text{A}$ $di_F/dt = -50\text{A}/\mu\text{s}$<br>$V_R = 30\text{V}$                   | $T_j = 25^\circ\text{C}$ |      |      | 35   | ns   |
| tfr      | Forward recovery time    | $I_F = 3\text{A}$ $di_F/dt = 50\text{A}/\mu\text{s}$<br>$V_{FR} = 1.1 \times V_F \text{ max}$ | $T_j = 25^\circ\text{C}$ |      | 70   |      | ns   |
| $V_{FP}$ | Forward recovery voltage |                                                                                               | $T_j = 25^\circ\text{C}$ |      | 1.6  |      | V    |

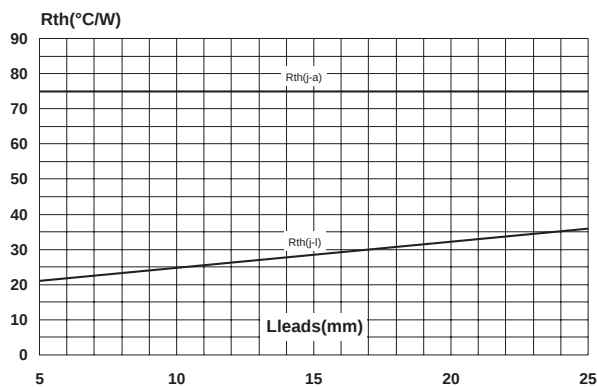
**Fig. 1:** Average forward power dissipation versus average forward current.



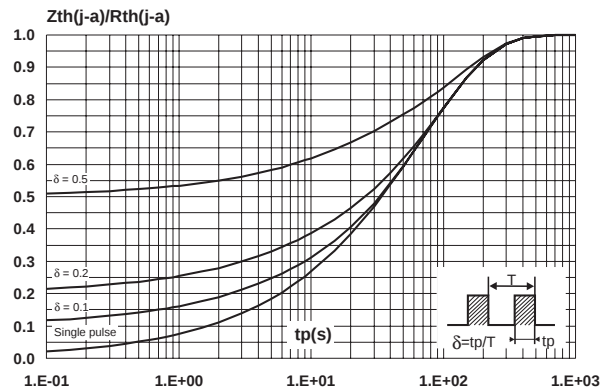
**Fig. 2:** Average forward current versus ambient temperature ( $\delta=0.5$ ).



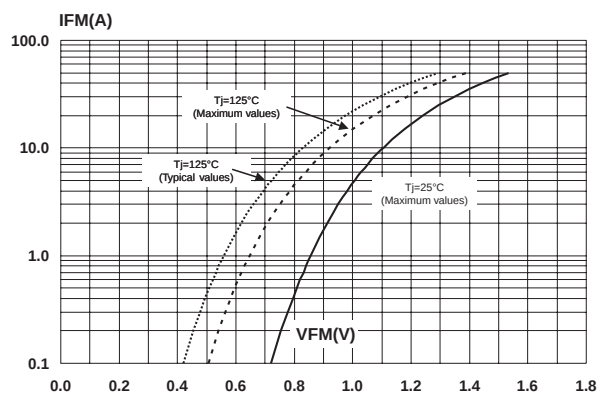
**Fig. 3:** Thermal resistance versus lead length.



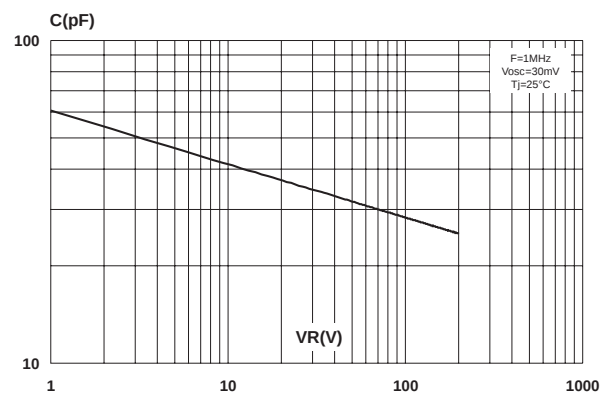
**Fig. 4:** Relative variation of thermal impedance junction ambient versus pulse duration (printed circuit board epoxy FR4, Leads = 10mm).



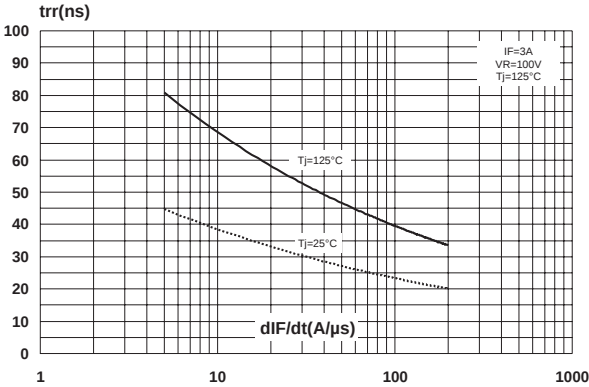
**Fig. 5:** Forward voltage drop versus forward current.



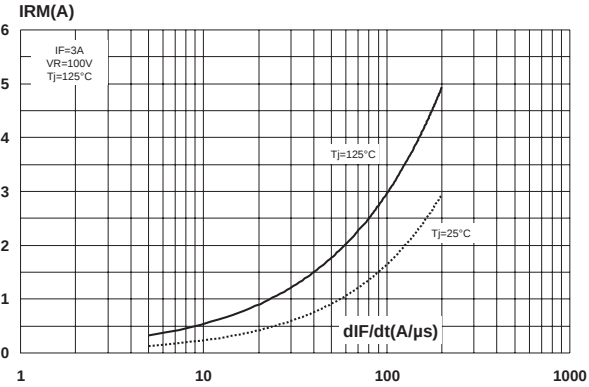
**Fig. 6:** Junction capacitance versus reverse voltage applied (typical values).



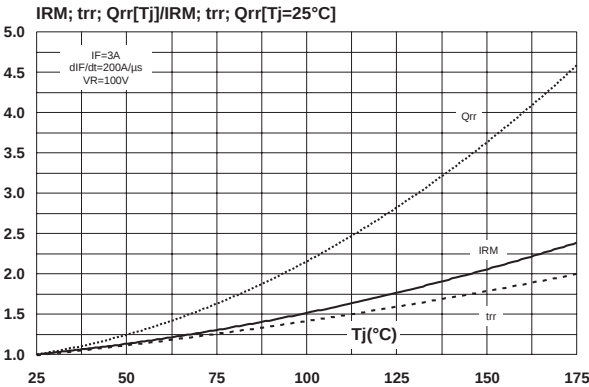
**Fig. 7:** Reverse recovery time versus  $dI_F/dt$  (90% confidence).



**Fig. 8:** Peak reverse recovery current versus  $dI_F/dt$  (90% confidence).

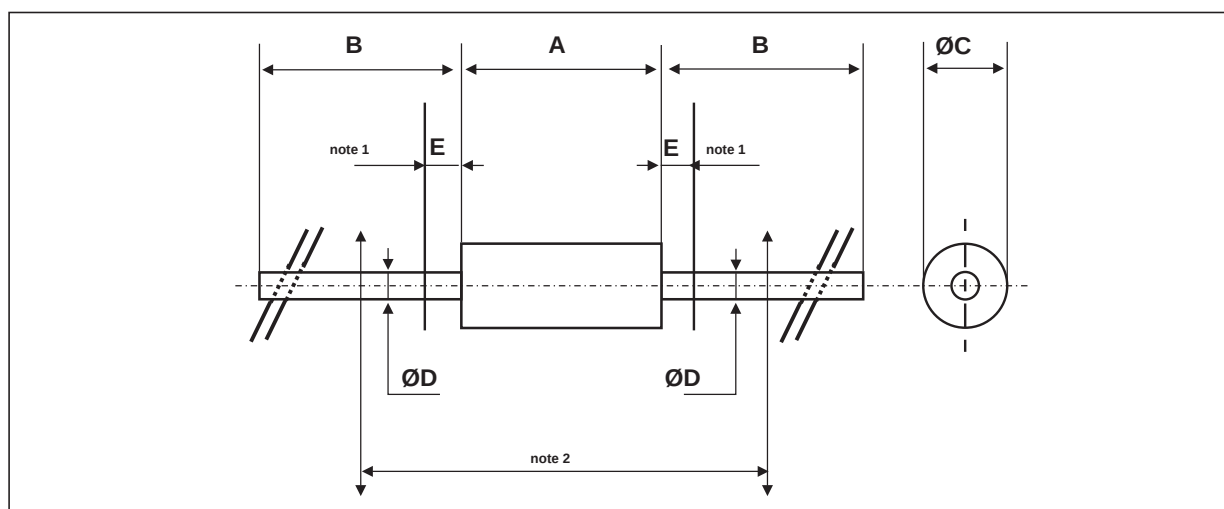


**Fig. 9:** Relative variations of dynamic parameters versus junction temperature.



## PACKAGE MECHANICAL DATA

DO-201AD



| REF. | DIMENSIONS  |      |        |       | NOTES                                                                                                                                                                                 |
|------|-------------|------|--------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Millimeters |      | Inches |       |                                                                                                                                                                                       |
|      | Min.        | Max. | Min.   | Max.  |                                                                                                                                                                                       |
| A    |             | 9.50 |        | 0.374 | 1 - The lead diameter Ø D is not controlled over zone E<br><br>2 - The minimum axial length within which the device may be placed with its leads bent at right angles is 0.59"(15 mm) |
| B    | 25.40       |      | 1.000  |       |                                                                                                                                                                                       |
| Ø C  |             | 5.30 |        | 0.209 |                                                                                                                                                                                       |
| Ø D  |             | 1.30 |        | 0.051 |                                                                                                                                                                                       |
| E    |             | 1.25 |        | 0.049 |                                                                                                                                                                                       |

| Ordering code | Marking | Package  | Weight | Base qty | Delivery mode |
|---------------|---------|----------|--------|----------|---------------|
| STTH302       | STTH302 | DO-201AD | 1.16 g | 600      | Ammopack      |
| STTH302RL     | STTH302 | DO-201AD | 1.16 g | 1900     | Tape and reel |

- White band indicates cathode
- Epoxy meets UL94,V0

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