

**TURBOSWITCH™ ULTRA-FAST HIGH VOLTAGE DIODE****MAJOR PRODUCT CHARACTERISTICS**

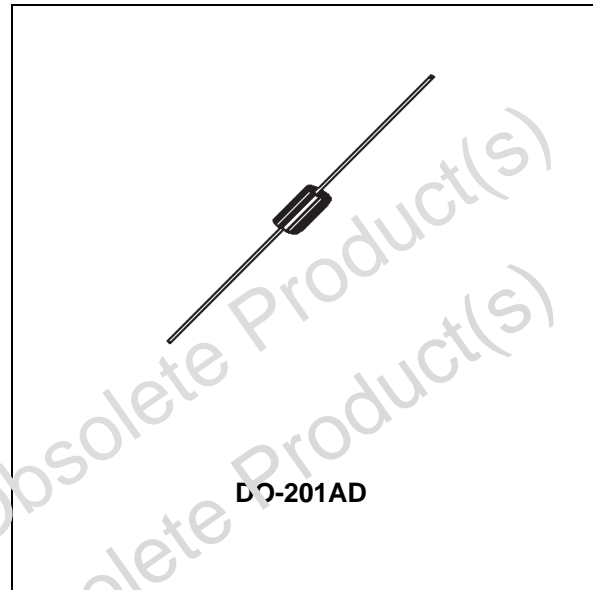
| | |
|------------------------------|--------------|
| I_P | 4 A |
| V_{RRM} | 600 V |
| t_{rr} (typ.) | 25 ns |
| V_F (max) | 1.5 V |

FEATURES AND BENEFITS

- SPECIFIC TO FREEWHEEL MODE OPERATIONS: FREEWHEEL OR BOOSTER DIODE
- ULTRA-FAST, AND SOFT RECOVERY
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR
- HIGH FREQUENCY OPERATIONS

DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes. TURBOSWITCH family, drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all freewheel mode operations and



is particularly suitable and efficient in motor control freewheel applications and in booster diode applications in power factor control circuitries. Packaged in DO-201AD this 600V device is particularly intended for use on 240V domestic mains.

ABSOLUTE RATINGS (limiting values)

| Symbol | Parameter | VALUE | Unit |
|------------------|--|--------------------------------------|------|
| V _{RRM} | Repetitive peak reverse voltage | 600 | V |
| I _P | Peak forward current (1) | T _{amb} = 65°C δ = 0.5 | A |
| I _{FRM} | Repetitive peak forward current | t _p = 5μs F = 5kHz square | A |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | A |
| T _j | Maximum operating junction temperature | 125 | °C |
| T _{stg} | Storage temperature range | - 40 to 150 | °C |

(1) square waveform and on infinite heatsink

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THERMAL DATA

| Symbol | Parameter | Max. | Unit |
|---------------|--|------|------|
| $R_{th(j-l)}$ | Junction to lead L lead = 10mm | 20 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit L lead = 10mm | 75 | °C/W |

STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Test conditions | | Typ. | Max. | Unit |
|----------|-------------------------|---------------------------|---|------|-------------|---------------------|
| V_F ** | Forward voltage drop | $I_F = 4\text{ A}$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | 1.25 | 1.75 1.5 | V V |
| I_R * | Reverse leakage current | $V_R = 0.8 V_{RRM}$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | 0.75 | 50 2 | μA mA |
| V_{to} | Threshold voltage | $I_p < 3 \cdot I_{F(AV)}$ | $T_j = 125^\circ\text{C}$ | | 1.15 | V |
| R_d | Dynamic resistance | | | | 85 | m Ω |

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

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

To evaluate the maximum conduction losses use the following equation :

$$P = V_{to} \times I_{F(AV)} + R_d \times I_F^2_{(RMS)}$$

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING

| Symbol | Parameter | Test conditions | Typ. | Max. | Unit |
|----------|-----------------------|---|------|------|------|
| t_{rr} | Reverse recovery time | $I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$ | 25 | | ns |
| | | $I_F = 1\text{ A}$ $di/dt = -50\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$ | | 55 | ns |

TURN-ON SWITCHING

| Symbol | Parameter | Test conditions | Typ. | Max. | Unit |
|----------|-----------------------|--|------|------|------|
| t_{fr} | Forward recovery time | $I_F = 4\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ Measured at $1.1 \times V_F$ max. $T_j = 25^\circ\text{C}$ | | 200 | ns |
| V_{FP} | Peak forward voltage | | | 20 | V |

Fig. 1: Power dissipation versus average forward current.

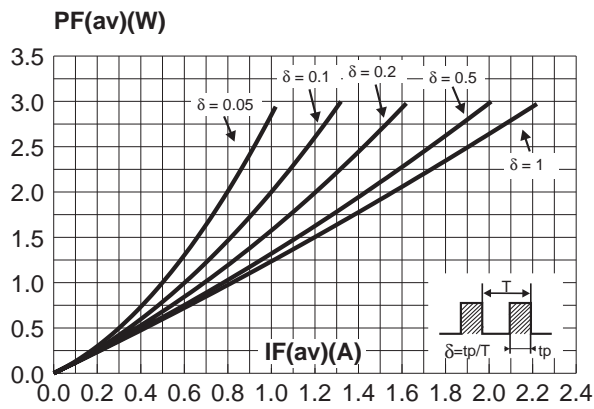


Fig. 2: Average forward current versus ambient temperature ($\delta=0.5$).

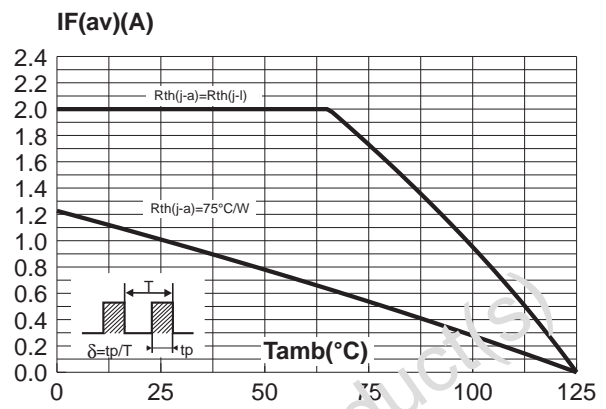


Fig. 3: Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board, $e(\text{Cu})=35\mu\text{m}$), recommended pad layout).

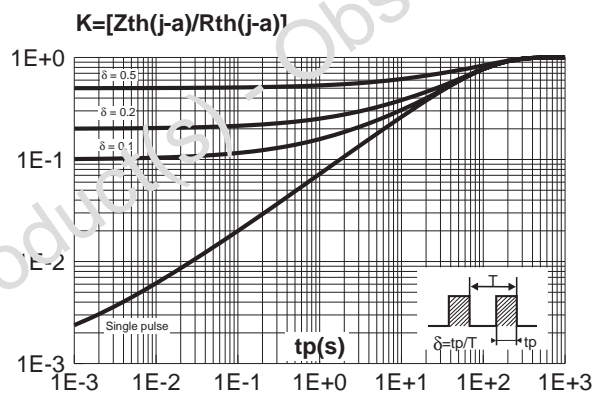


Fig. 4-2 : Forward voltage drop versus forward current (high level).

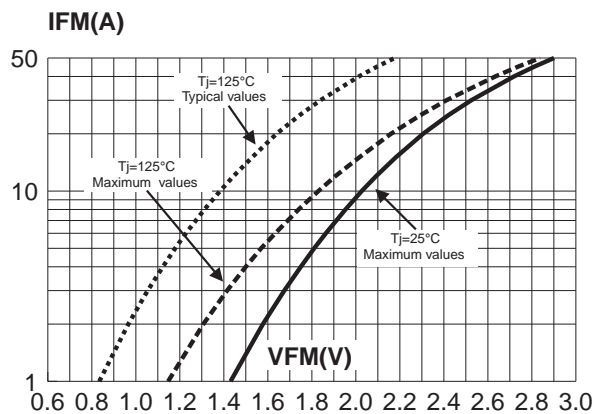


Fig. 4-1: Forward voltage drop versus forward current (low level).

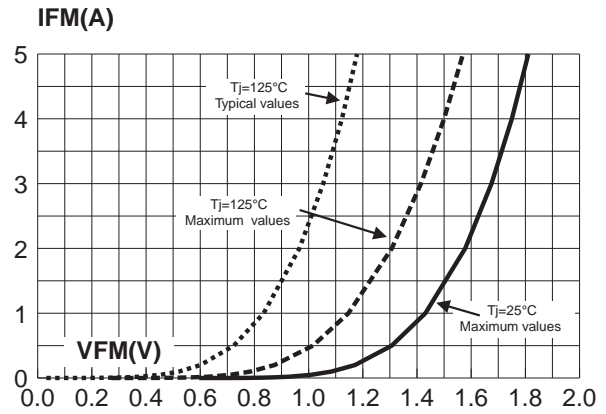


Fig 5 : Reverse recovery time versus dI_F/dt .

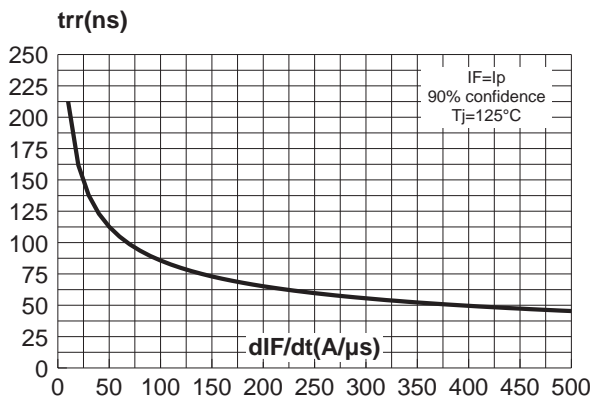


Fig. 6: Reverse recovery current versus dI_F/dt .

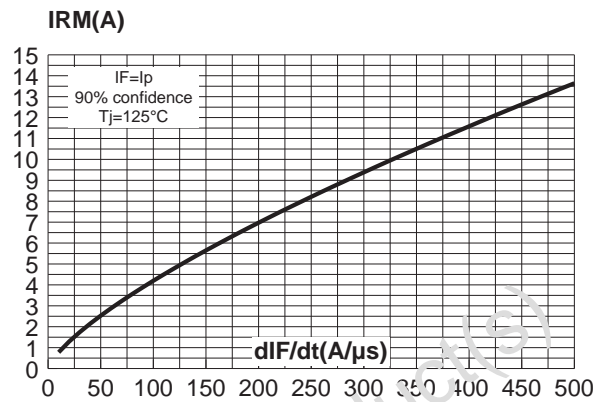


Fig. 7: Transient peak forward voltage versus dI_F/dt .

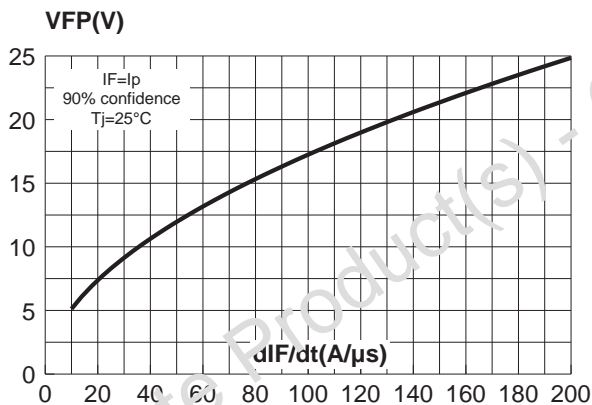


Fig. 9: Junction capacitance versus reverse voltage applied (typical values).

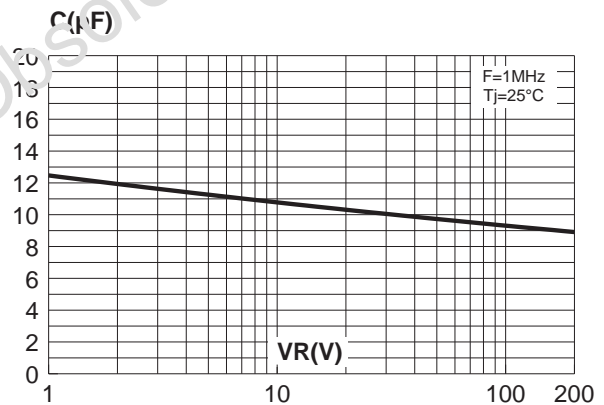
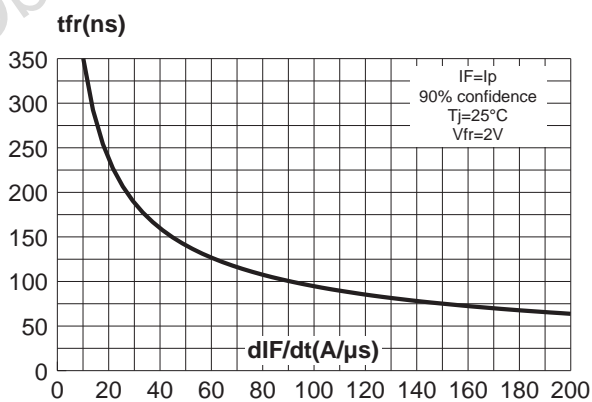
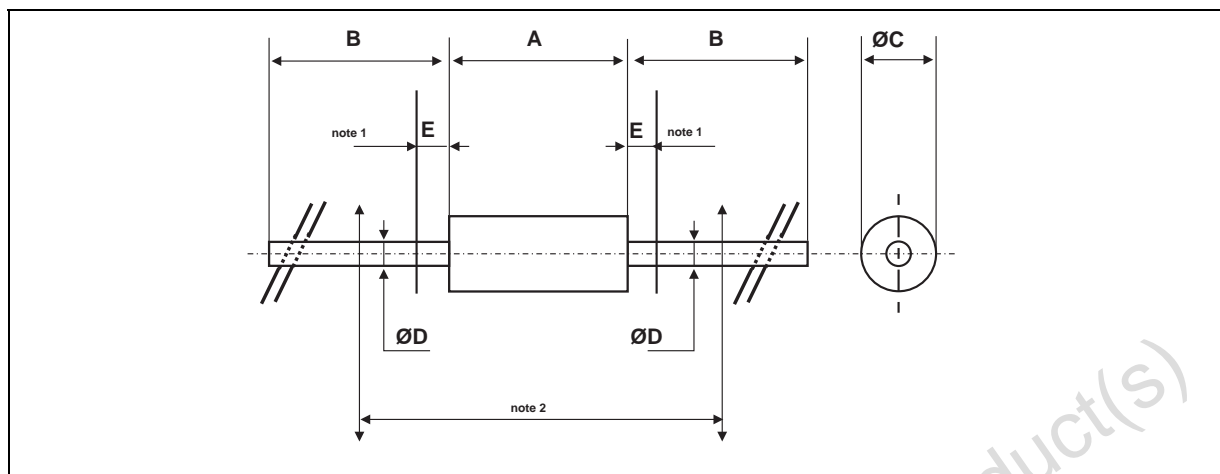


Fig. 8: Forward recovery time versus dI_F/dt .



PACKAGE MECHANICAL DATA
 DO-201AD


| REF. | DIMENSIONS | | | | NOTES |
|-----------------|-------------|------|--------|-------|--|
| | Millimeters | | Inches | | |
| | Min. | Max. | Min. | Max. | |
| A | | 9.50 | | 0.374 | 1 - The lead diameter $\varnothing D$ is not controlled over zone E 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 | | |
| $\varnothing C$ | | 5.30 | | 0.209 | |
| $\varnothing D$ | | 1.30 | | 0.051 | |
| E | | 1.25 | | 0.049 | |

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|---------|----------|--------|----------|---------------|
| STTA406 | STTA406 | DO-201AD | 1.166g | 600 | Ammopack |
| STTA406RL | STTA406 | DO-201AD | 1.166g | 1900 | Tape & reel |

- Cooling method: by convection (method A)
- Band indicated cathode
- Epoxy meets UL94,V0

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