

TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

Table 1: Main Product Characteristics

| | |
|----------------|-------------|
| $I_{F(AV)}$ | 3 A |
| V_{RRM} | 600 V |
| $I_R (max)$ | 100 μ A |
| T_j | 175°C |
| $V_F (typ)$ | 1.0 V |
| $t_{rr} (typ)$ | 35 ns |

FEATURES AND BENEFITS

- Ultrafast switching
- Low forward voltage drop
- Low thermal resistance
- Low leakage current (platinum doping)

DESCRIPTION

The STTH3R06, which is using ST Turbo 2 600V technology, is specially suited for use in switching power supplies, inverters and as a free wheeling diode.

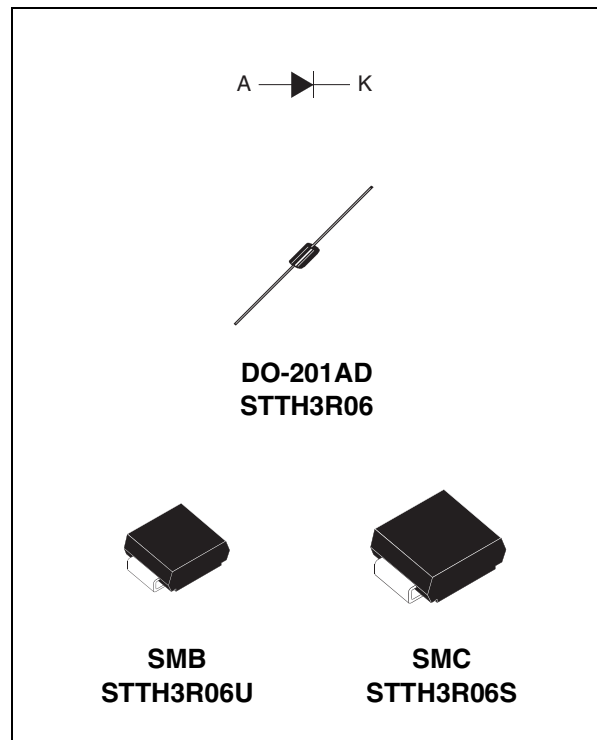


Table 2: Order Codes

| Part Number | Marking |
|-------------|----------|
| STTH3R06 | STTH3R06 |
| STTH3R06RL | STTH3R06 |
| STTH3R06U | R06U |
| STTH3R06S | R6S |

Table 3: Absolute Ratings (limiting values)

| Symbol | Parameter | | | Value | Unit |
|--------------|---|-----------|-----------------------------------|--------------|------------------|
| V_{RRM} | Repetitive peak reverse voltage | | | 600 | V |
| $I_{F(RMS)}$ | RMS forward current | | | 10 | A |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ | DO-201AD | $T_I = 80^\circ\text{C}$ | 3 | A |
| | | SMB | $T_I = 55^\circ\text{C}$ | | |
| | | SMC | $T_I = 80^\circ\text{C}$ | | |
| I_{FSM} | Surge non repetitive forward current | DO-201AD | $t_p = 10\text{ms}$ sinusoidal | 55 | A |
| | | SMB / SMC | | 45 | |
| T_{stg} | Storage temperature range | | | -65 to + 175 | $^\circ\text{C}$ |
| T_j | Maximum operating junction temperature | | | 175 | $^\circ\text{C}$ |

Table 4: Thermal Parameters

| Symbol | Parameter | | Maximum | Unit |
|---------------|-----------------------------------|--------------------|---------|--------------------|
| $R_{th(j-l)}$ | Junction to lead | DO-201AD L = 10 mm | 20 | $^\circ\text{C/W}$ |
| | | SMB | 25 | |
| | | SMC | 20 | |
| $R_{th(j-a)}$ | Junction to ambient (see fig. 13) | DO-201AD L = 10 mm | 75 | $^\circ\text{C/W}$ |

Table 5: 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 | μA |
| | | $T_j = 150^\circ\text{C}$ | | | 15 | 100 | |
| V_F | Forward voltage drop | $T_j = 25^\circ\text{C}$ | $I_F = 3\text{A}$ | | | 1.7 | V |
| | | $T_j = 150^\circ\text{C}$ | | | 1.0 | 1.25 | |

To evaluate the conduction losses use the following equation: $P = 1.03 \times I_{F(AV)} + 0.09 I_{F(RMS)}^2$

Table 6: Dynamic Characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|----------|--------------------------|--------------------------|--|------|-----|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25^\circ\text{C}$ | $I_F = 0.5\text{A}$ $I_{RR} = 0.25\text{A}$ $I_R = 1\text{A}$ | | | 30 | ns |
| | | | $I_F = 1\text{A}$ $di_F/dt = -50\text{ A}/\mu\text{s}$ $V_R = 30\text{V}$ | | 35 | | |
| t_{fr} | Forward recovery time | $T_j = 25^\circ\text{C}$ | $I_F = 3\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ | | | 100 | ns |
| V_{FP} | Forward recovery voltage | | $I_F = 3\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ | | | 10 | V |

Figure 1: Conduction losses versus average current

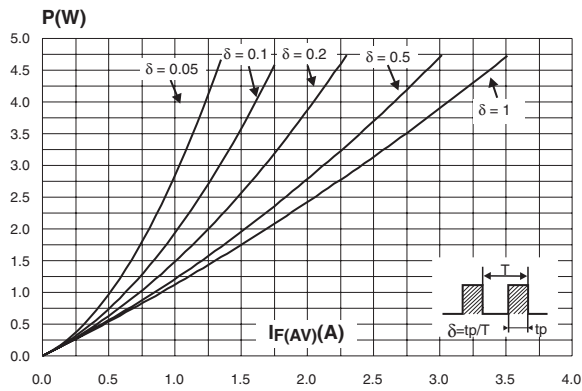


Figure 2: Forward voltage drop versus forward current

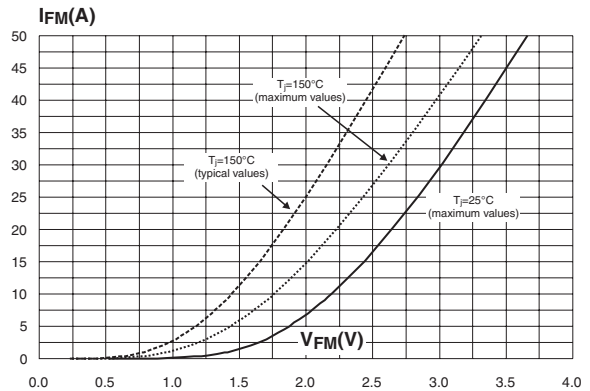


Figure 3: Relative variation of thermal impedance junction ambient versus pulse duration (epoxy printed circuit FR4, L_leads = 10mm, S_CU=1cm²)

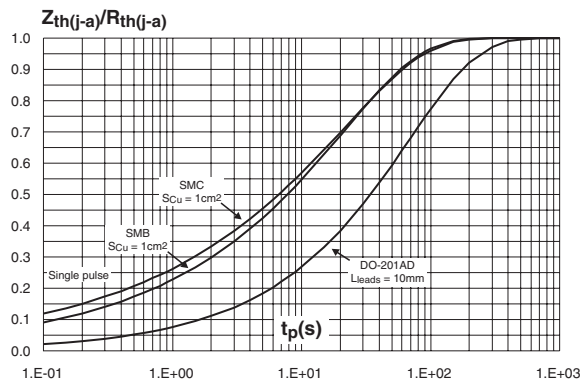


Figure 4: Peak reverse recovery current versus di_F/dt (typical values)

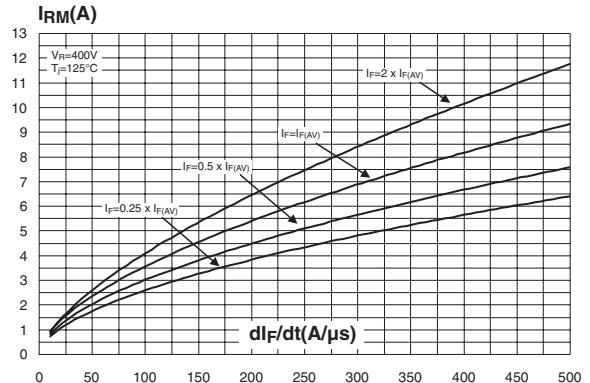


Figure 5: Reverse recovery time versus di_F/dt (typical values)

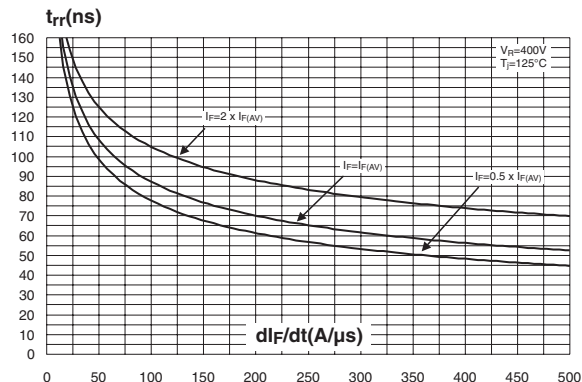


Figure 6: Reverse recovery charges versus di_F/dt (typical values)

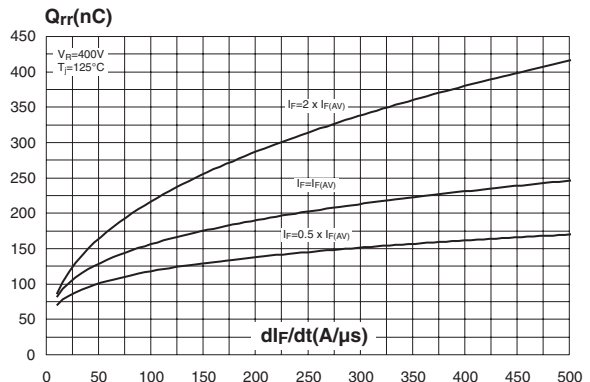


Figure 7: Softness factor versus di_F/dt (typical values)

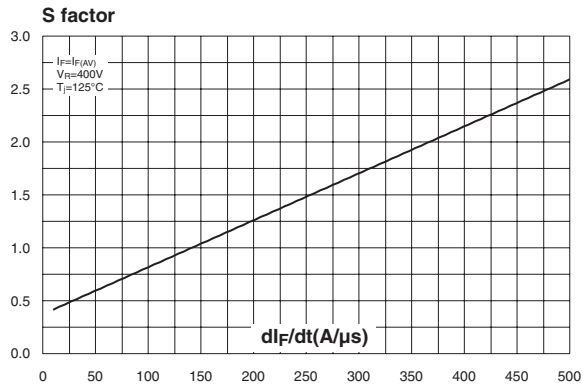


Figure 8: Relative variations of dynamic parameters versus junction temperature

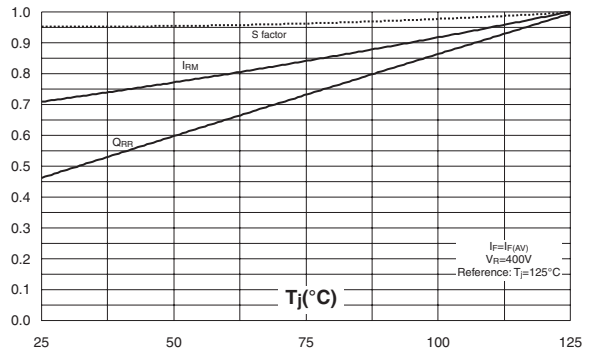


Figure 9: Transient peak forward voltage versus di_F/dt (typical values)

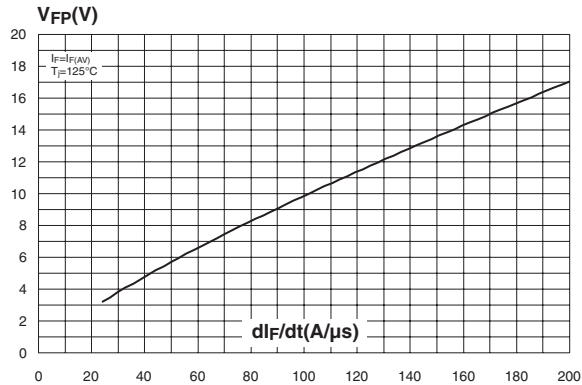


Figure 10: Forward recovery time versus di_F/dt (typical values)

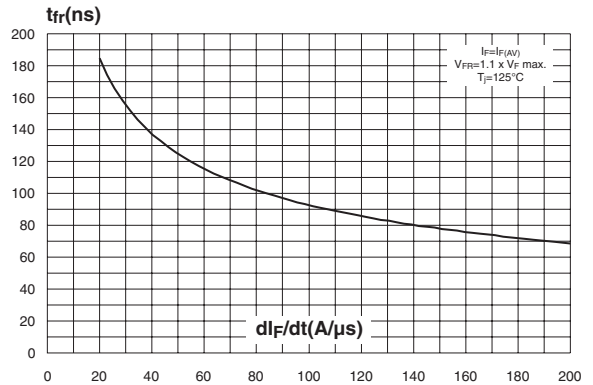


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

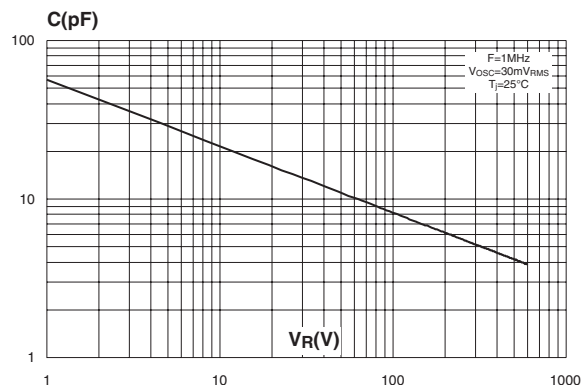


Figure 12: Thermal resistance junction to ambient versus copper surface under lead (epoxy FR4, $e_{Cu} = 35\mu m$) (DO-201AD)

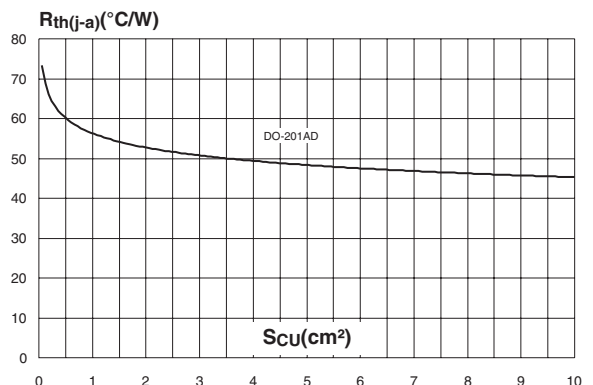


Figure 13: Thermal resistance junction to ambient versus copper surface under lead (epoxy FR4, $e_{CU}=35\mu\text{m}$) (SMB / SMC)

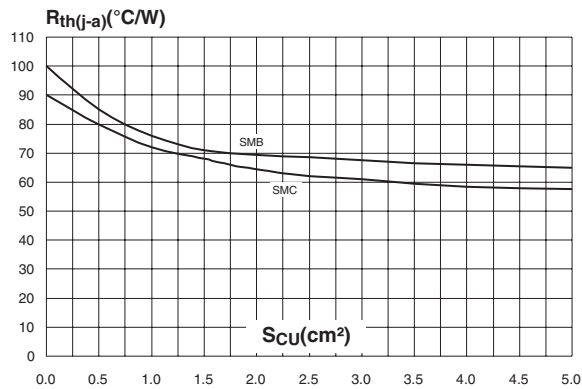


Figure 14: Thermal resistance versus lead length

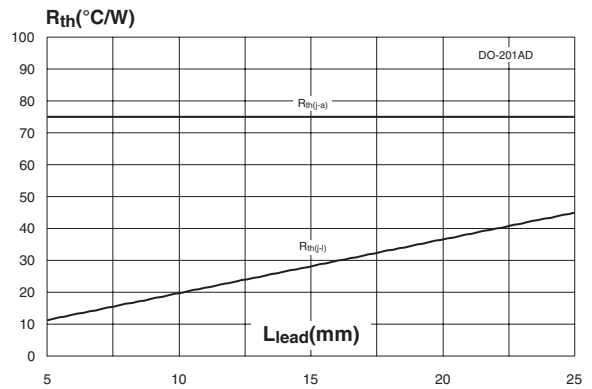


Figure 15: SMB Package Mechanical Data

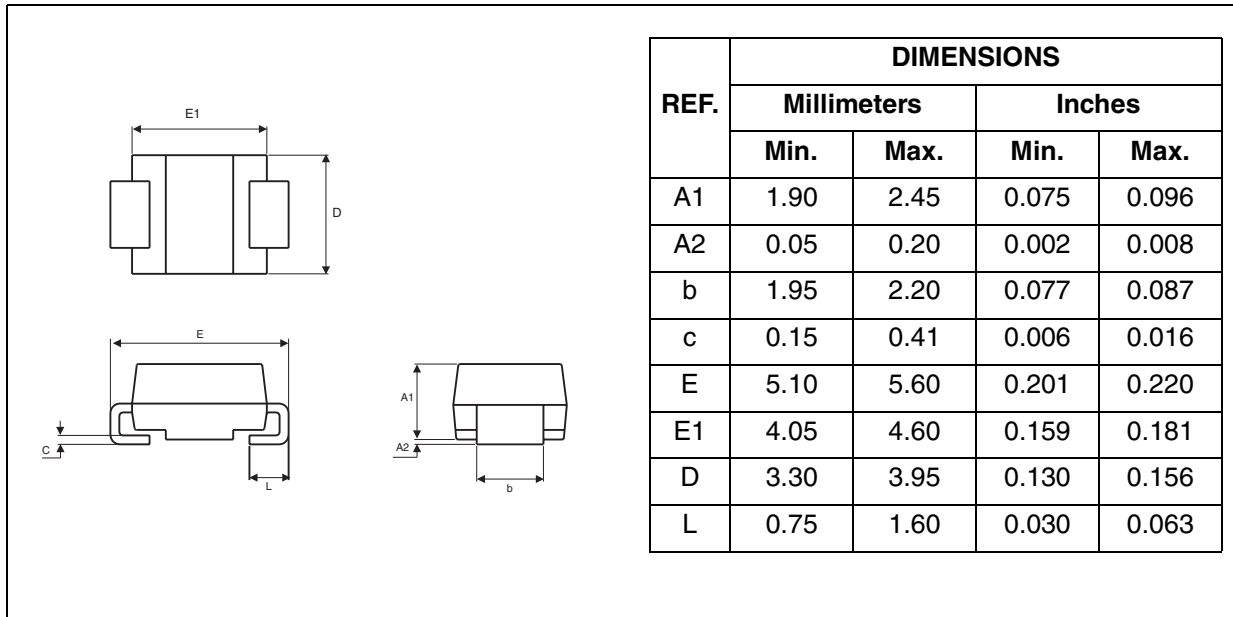


Figure 16: SMB Foot Print Dimensions
(in millimeters)

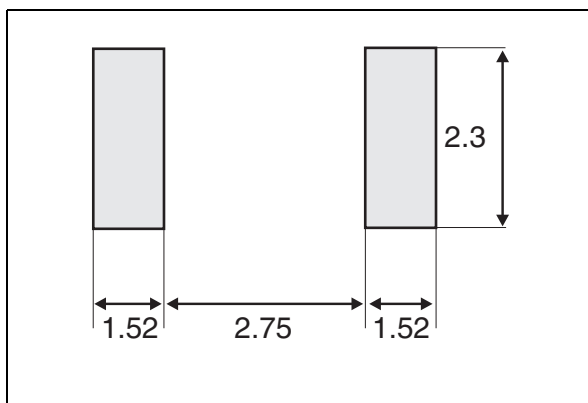
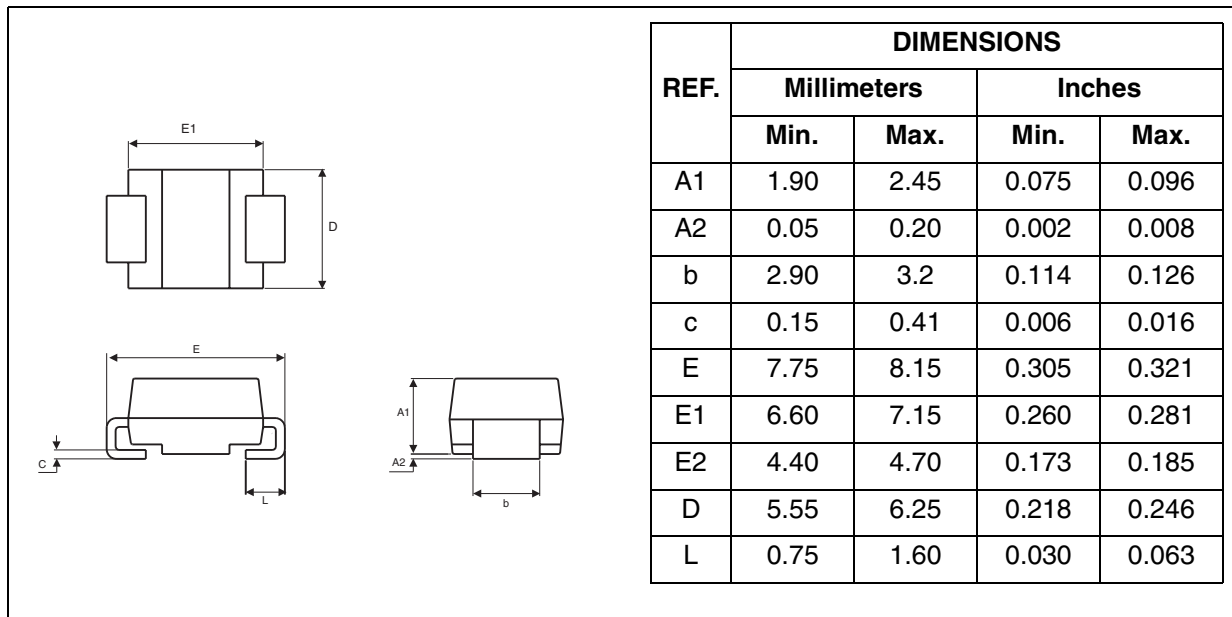
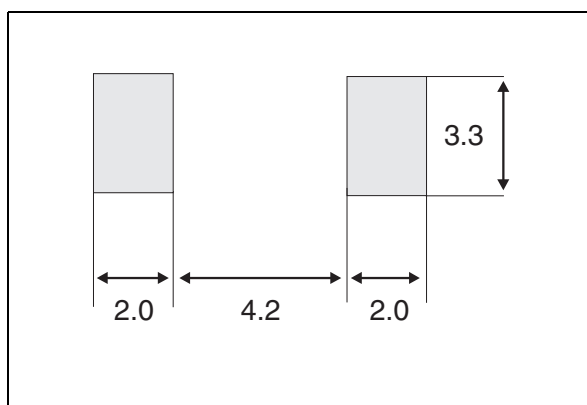


Figure 17: SMC Package Mechanical Data

Figure 18: SMC Foot Print Dimensions
(in millimeters)

STTH3R06

Figure 19: DO-201AD Package Mechanical Data

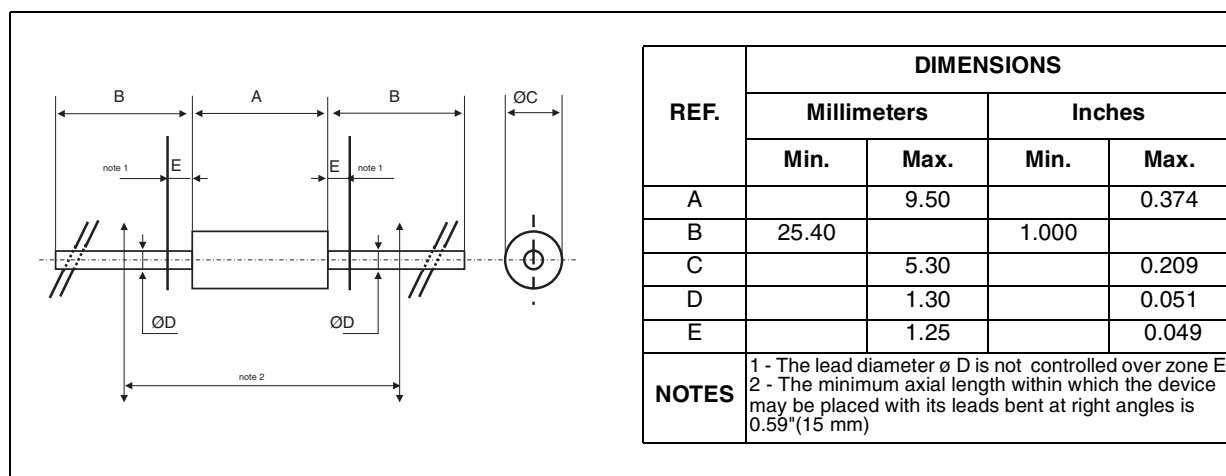


Table 7: Ordering Information

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|----------|----------|---------|----------|---------------|
| STTH3R06 | STTH3R06 | DO-201AD | 1.12 g | 600 | Ammopack |
| STTH3R06-RL | STTH3R06 | DO-201AD | 1.12 g | 1900 | Tape & reel |
| STTH3R06U | 3R6U | SMB | 0.11 g | 2500 | Tape & reel |
| STTH3R06S | R6S | SMC | 0.243 g | 2500 | Tape & reel |

- Epoxy meets UL94, V0
- Band indicated cathode (DO-201AD)
- Bending method: see application note **AN1471** (DO-201AD)

Table 8: Revision History

| Date | Revision | Description of Changes |
|-------------|----------|----------------------------|
| March-2003 | 1 | First issue |
| 07-Sep-2004 | 2 | SMB and SMC packages added |

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