



# STTH3R06

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

Table 1: Main Product Characteristics

|                |             |
|----------------|-------------|
| $I_{F(AV)}$    | 3 A         |
| $V_{RRM}$      | 600 V       |
| $I_R (max)$    | 100 $\mu A$ |
| $T_j$          | 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.

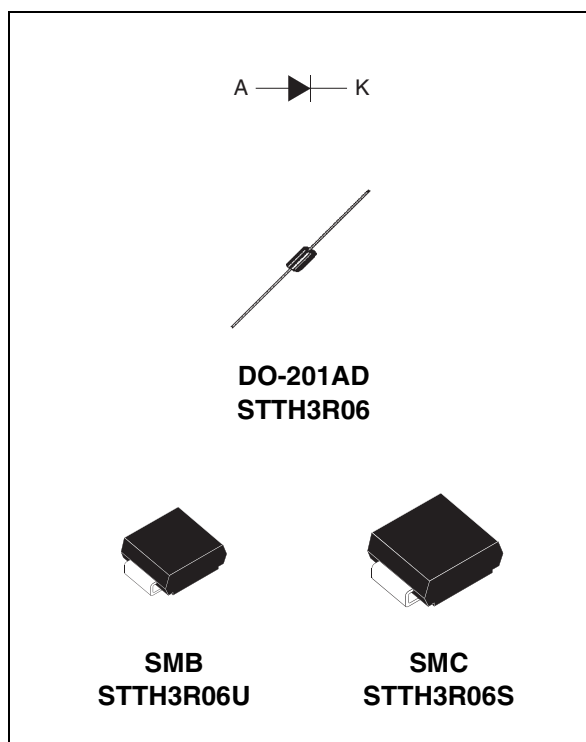


Table 2: Order Codes

| Part Number | Marking  |
|-------------|----------|
| STTH3R06    | STTH3R06 |
| STTH3R06RL  | STTH3R06 |
| STTH3R06U   | 3R6U     |
| 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<br>$\delta = 0.5$ | 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  | $t_p = 10\text{ms}$      | 55           | A                |
|              |                                           | SMB / SMC | sinusoidal               | 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**

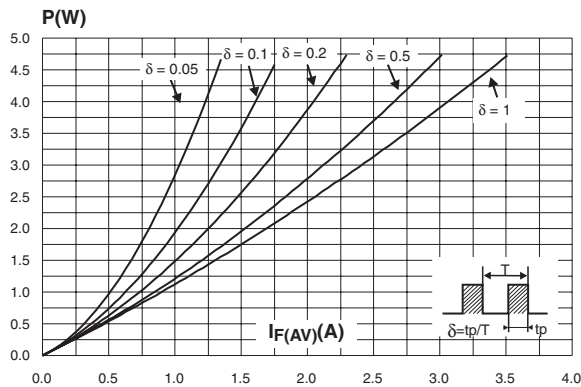
| Symbol | Parameter               | Test conditions           |                   | Min. | Typ | Max. | Unit          |
|--------|-------------------------|---------------------------|-------------------|------|-----|------|---------------|
| $I_R$  | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$   |      |     | 3    | $\mu\text{A}$ |
|        |                         | $T_j = 150^\circ\text{C}$ |                   |      | 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:  $P = 1.03 \times I_{F(AV)} + 0.09 I_{F(RMS)}^2$

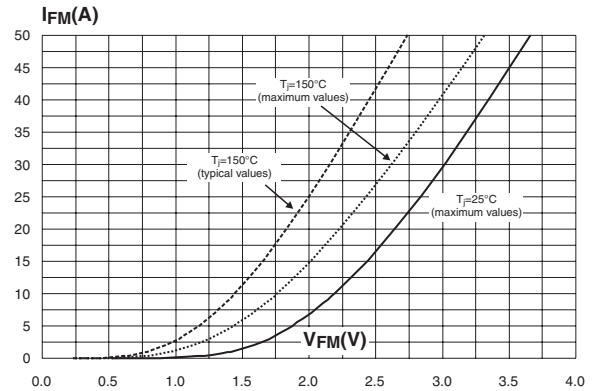
**Table 6: Dynamic Characteristics**

| 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    | $T_j = 25^\circ\text{C}$ | $I_F = 3\text{A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$<br>$V_{FR} = 1.1 \times V_{Fmax}$ |      |     | 100  | ns   |
| $V_{FP}$ | Forward recovery voltage |                          | $I_F = 3\text{A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$                                   |      |     | 10   | V    |

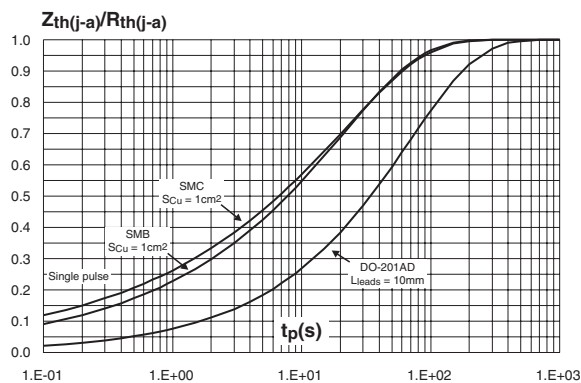
**Figure 1: Conduction losses versus average current**



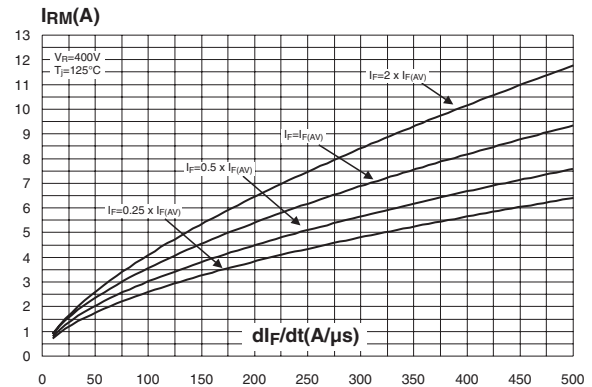
**Figure 2: Forward voltage drop versus forward current**



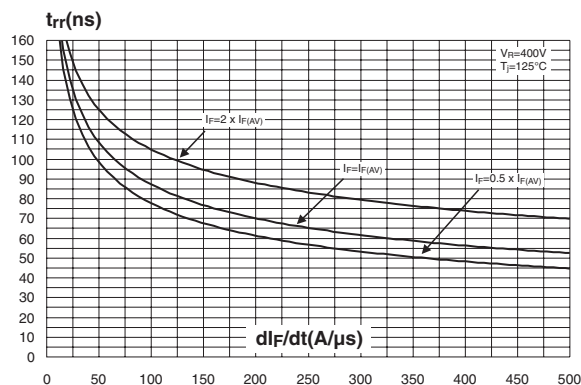
**Figure 3: Relative variation of thermal impedance junction ambient versus pulse duration (epoxy printed circuit FR4,  $L_{leads} = 10\text{mm}$ ,  $S_{Cu} = 1\text{cm}^2$ )**



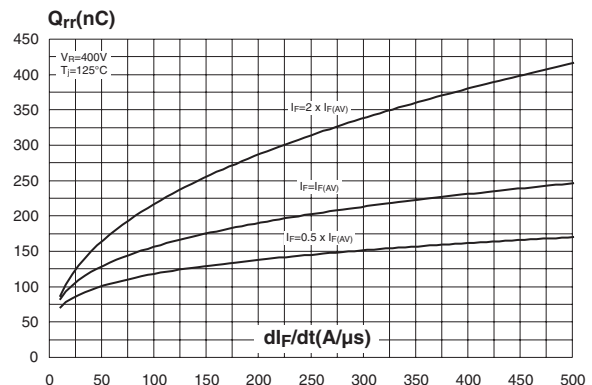
**Figure 4: Peak reverse recovery current versus  $di_F/dt$  (typical values)**



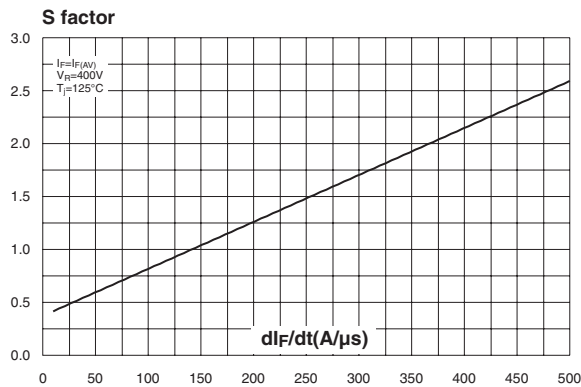
**Figure 5: Reverse recovery time versus  $di_F/dt$  (typical values)**



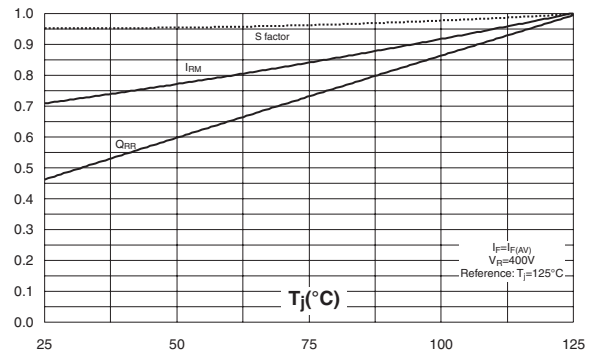
**Figure 6: Reverse recovery charges versus  $di_F/dt$  (typical values)**



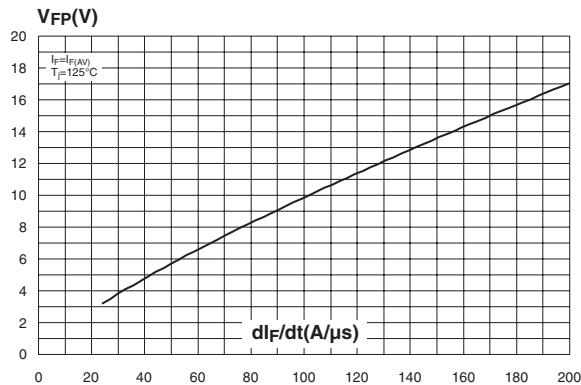
**Figure 7: Softness factor versus  $di_F/dt$  (typical values)**



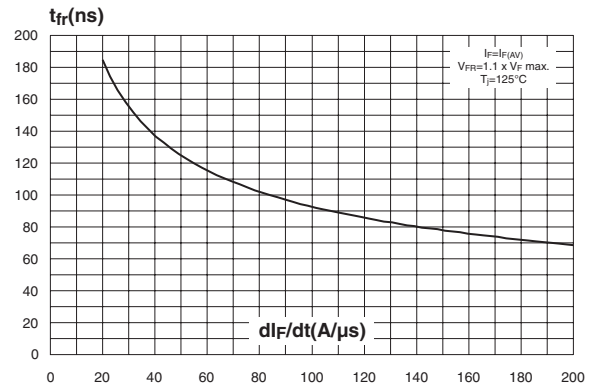
**Figure 8: Relative variations of dynamic parameters versus junction temperature**



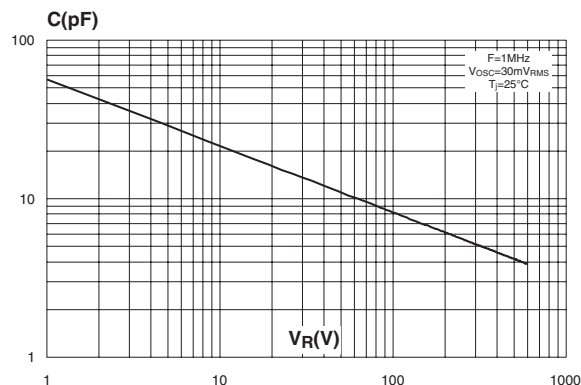
**Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values)**



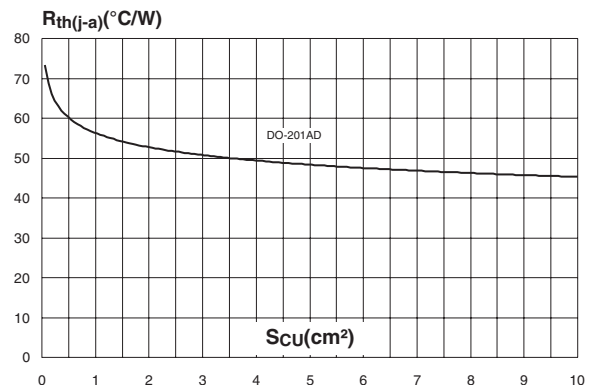
**Figure 10: Forward recovery time versus  $di_F/dt$  (typical values)**



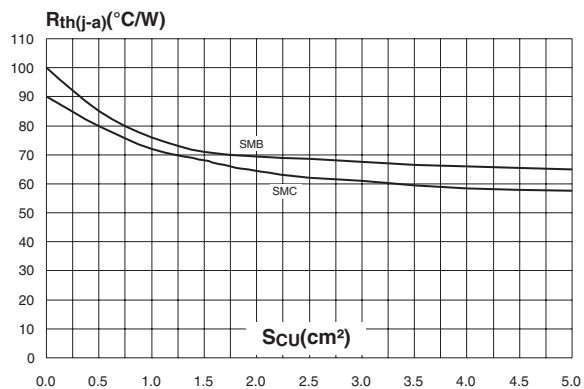
**Figure 11: Junction capacitance versus reverse voltage applied (typical values)**



**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,  $e_{Cu}=35\mu m$ ) (SMB / SMC)**



**Figure 14: Thermal resistance versus lead length**

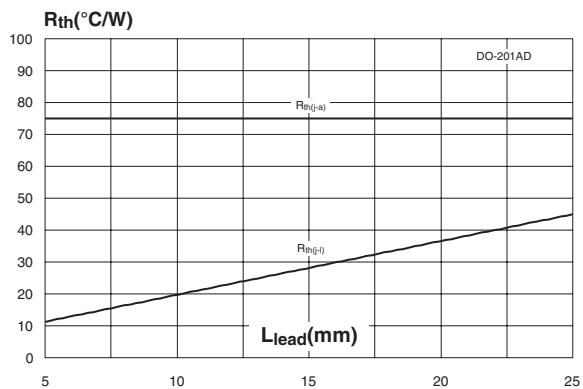


Figure 15: SMB Package Mechanical Data

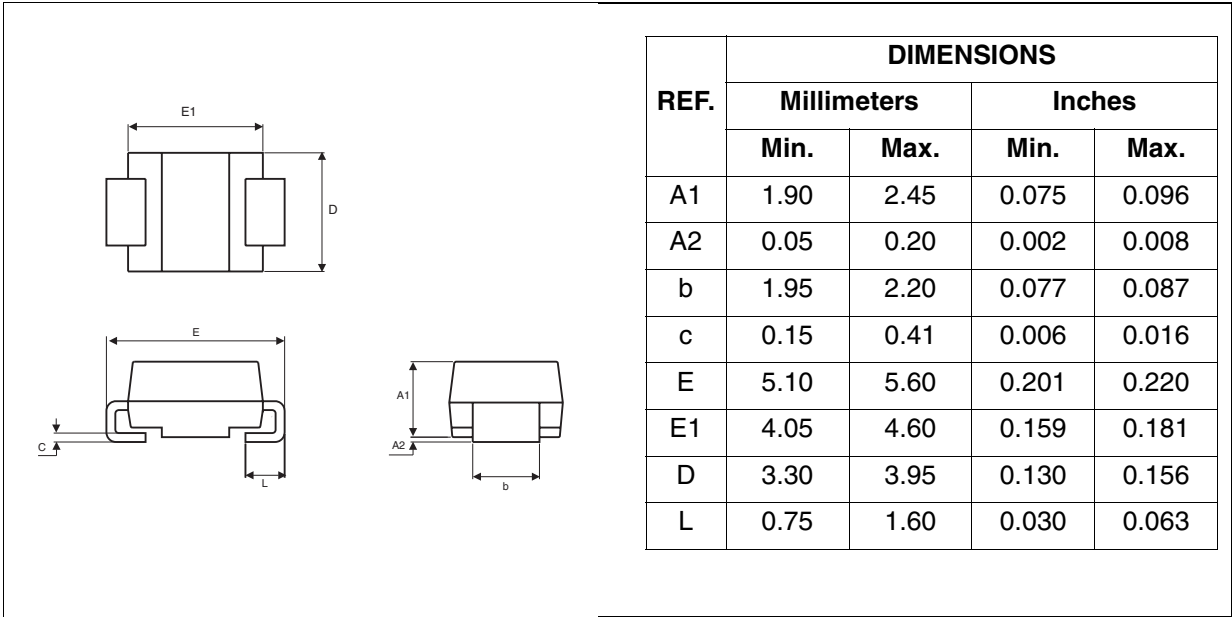
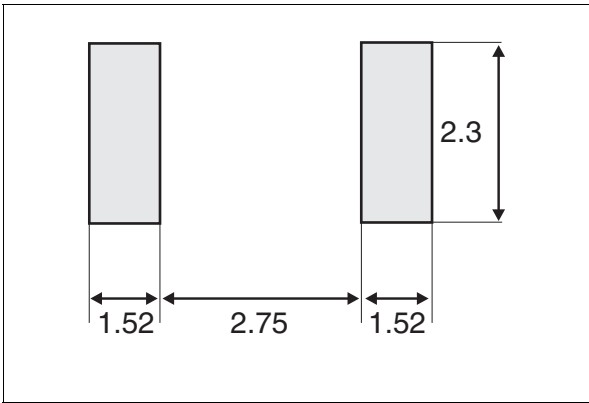


Figure 16: SMB Foot Print Dimensions  
(in millimeters)



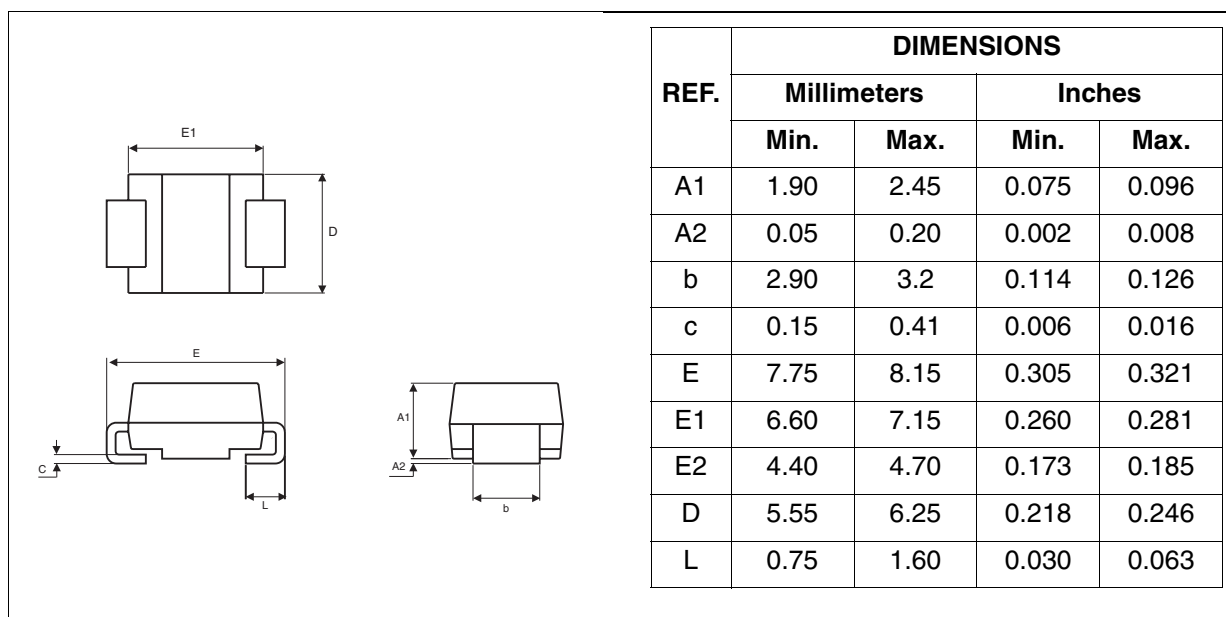
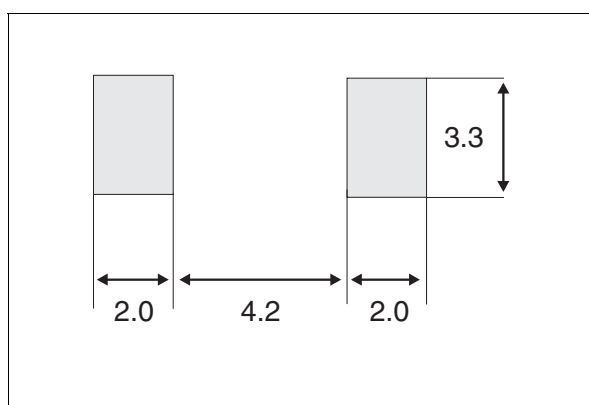
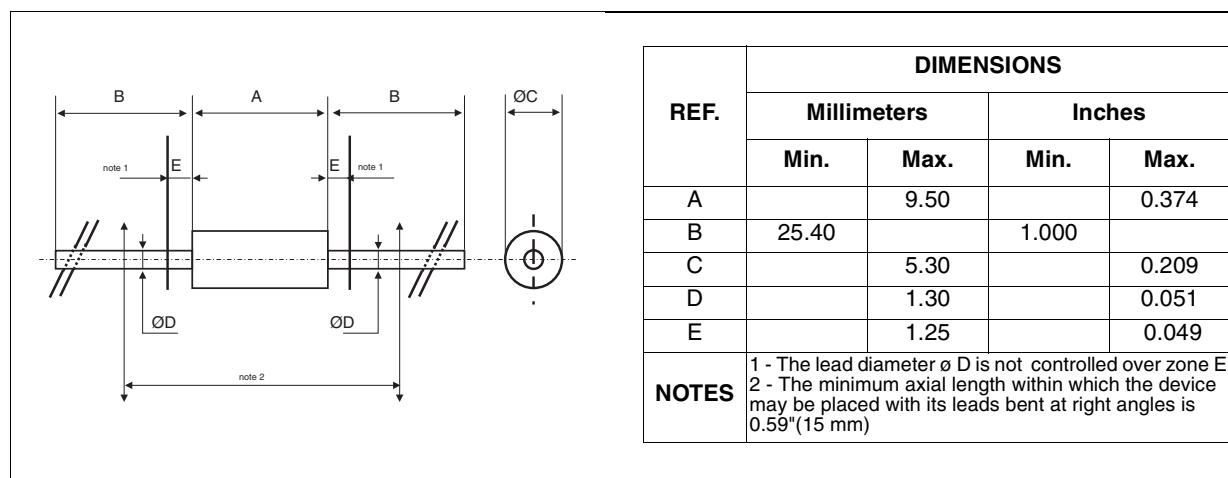
**Figure 17: SMC Package Mechanical Data****Figure 18: SMC Foot Print Dimensions**  
(in millimeters)

Figure 19: DO-201AD Package Mechanical Data



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

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                                                         |
| 14-Oct-2005 | 3        | Changed marking of STTH3R06U from R06U to 3R6U on page 1. Added ECOPACK statement. |

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