

## 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       |
| $V_F (typ)$    | 0.85 V      |
| $t_{rr} (typ)$ | 60 ns       |

### FEATURES AND BENEFITS

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

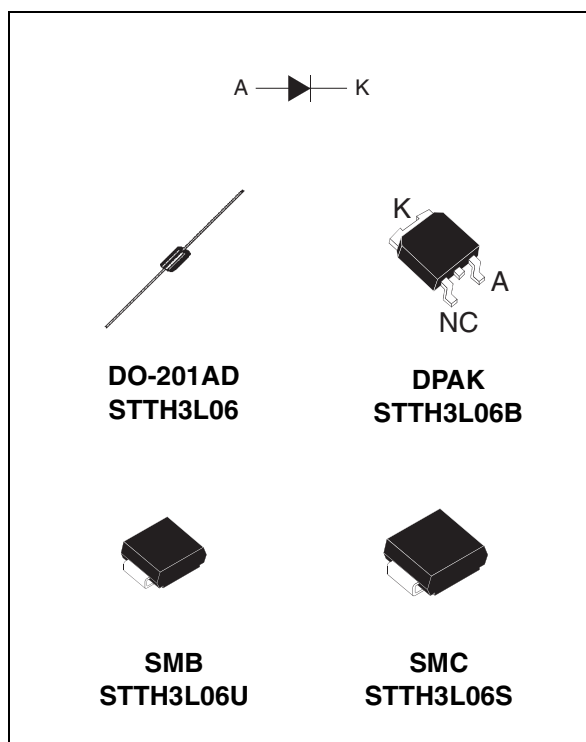
### DESCRIPTION

The STTH3L06, which is using ST Turbo 2 600V technology, is specially suited as boost diode in discontinuous or critical mode power factor corrections.

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

**Table 2: Order Codes**

| Part Number  | Marking   |
|--------------|-----------|
| STTH3L06     | STTH3L06  |
| STTH3L06RL   | STTH3L06  |
| STTH3L06B    | STTH3L06B |
| STTH3L06B-TR | STTH3L06B |
| STTH3L06U    | 3L6U      |
| STTH3L06S    | S06       |



**Table 3: Absolute Ratings** (limiting values)

| Symbol       | Parameter                                 |                      | Value        | Unit |
|--------------|-------------------------------------------|----------------------|--------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage           |                      | 600          | V    |
| $I_{F(RMS)}$ | RMS forward current                       | DO-201AD / SMB / SMC | 10           | A    |
|              |                                           | DPAK                 | 6            |      |
| $I_{F(AV)}$  | Average forward current<br>$\delta = 0.5$ | DO-201AD             | TI = 100°C   | A    |
|              |                                           | DPAK                 | TI = 155°C   |      |
|              |                                           | SMB                  | TI = 80°C    |      |
|              |                                           | SMC                  | TI = 100°C   |      |
| $I_{FSM}$    | Surge non repetitive forward current      | DO-201AD             | tp = 10ms    | A    |
|              |                                           | SMB / SMC            | sinusoidal   |      |
|              |                                           | DPAK                 |              |      |
| $T_{stg}$    | Storage temperature range                 |                      | -65 to + 175 | °C   |
| $T_j$        | Maximum operating junction temperature    |                      | 175          | °C   |

**Table 4: Thermal Parameters**

| Symbol        | Parameter                         |                    | Maximum | Unit |
|---------------|-----------------------------------|--------------------|---------|------|
| $R_{th(j-l)}$ | Junction to lead                  | DO-201AD L = 10 mm | 20      | °C/W |
|               |                                   | DPAK               | 5.5     |      |
|               |                                   | SMB                | 25      |      |
|               |                                   | SMC                | 20      |      |
| $R_{th(j-a)}$ | Junction to ambient (see fig. 13) | DO-201AD L = 10 mm | 75      | °C/W |

**Table 5: Static Electrical Characteristics**

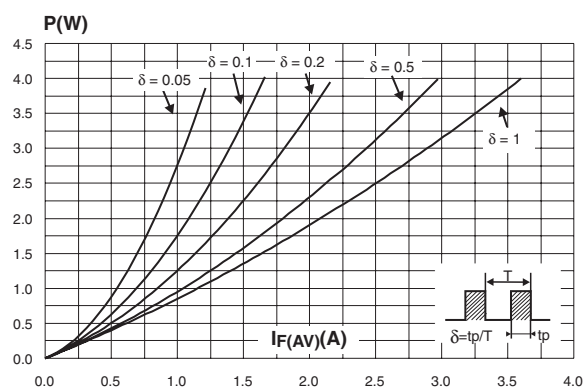
| Symbol | Parameter               | Test conditions           |                   | Min. | Typ  | Max. | Unit          |
|--------|-------------------------|---------------------------|-------------------|------|------|------|---------------|
| $I_R$  | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$   |      |      | 3    | $\mu\text{A}$ |
|        |                         | $T_j = 150^\circ\text{C}$ |                   |      | 15   | 100  |               |
| $V_F$  | Forward voltage drop    | $T_j = 25^\circ\text{C}$  | $I_F = 3\text{A}$ |      |      | 1.3  | V             |
|        |                         | $T_j = 150^\circ\text{C}$ |                   |      | 0.85 | 1.05 |               |

To evaluate the conduction losses use the following equation:  $P = 0.89 \times I_{F(AV)} + 0.055 I_F^2(RMS)$

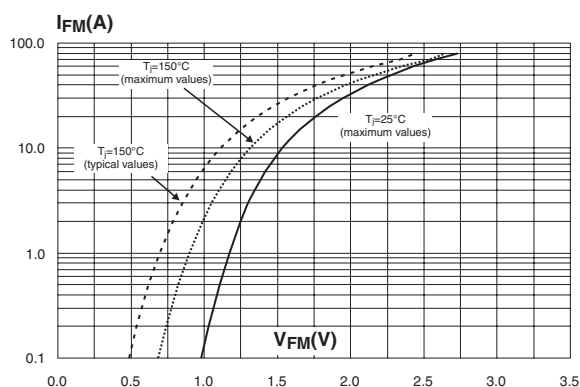
**Table 6: Dynamic Characteristics**

| Symbol   | Parameter                | Test conditions          |                                                                                          | Min. | Typ | Max. | Unit |
|----------|--------------------------|--------------------------|------------------------------------------------------------------------------------------|------|-----|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25^\circ\text{C}$ | $I_F = 1\text{A}$ $di_F/dt = -50\text{ A}/\mu\text{s}$ $V_R = 30\text{V}$                |      | 60  | 85   | ns   |
| $t_{fr}$ | 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 |                          | $I_F = 3\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$                                   |      |     | 7.5  | V    |

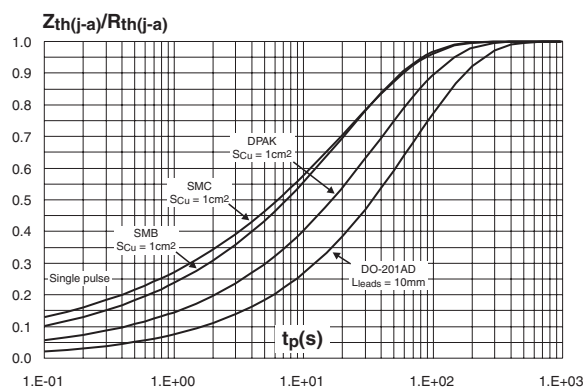
**Figure 1: Conduction losses versus average current**



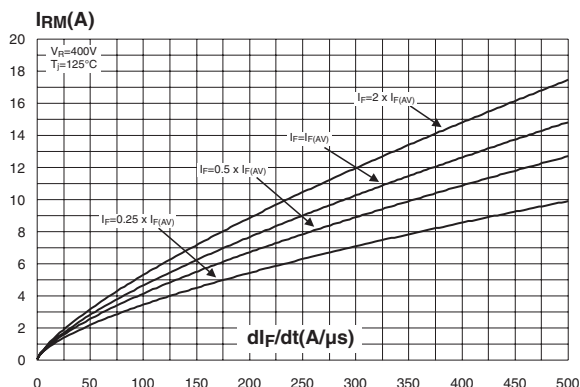
**Figure 2: Forward voltage drop versus forward current**



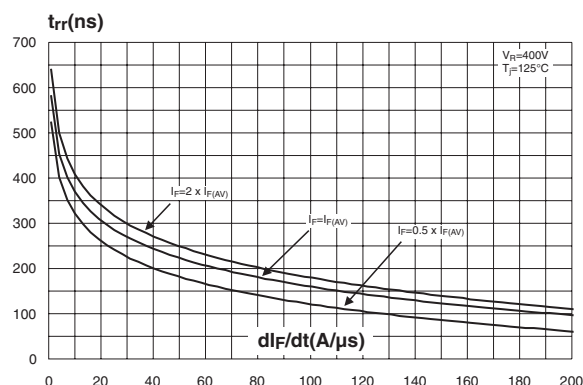
**Figure 3: Relative variation of thermal impedance junction ambient versus pulse duration (epoxy printed circuit FR4,  $L_{leads} = 10\text{mm}$ ,  $S_{CU} = 1\text{cm}^2$ )**



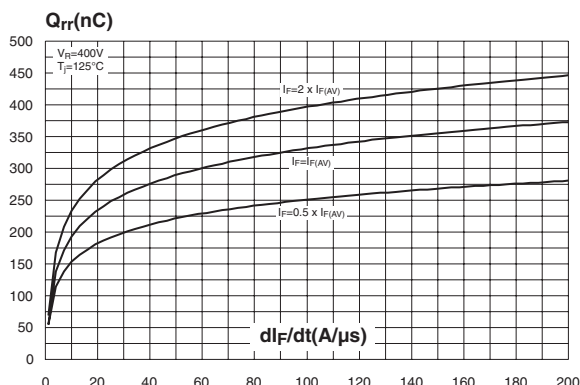
**Figure 4: Peak reverse recovery current versus  $dI_F/dt$  (typical values)**



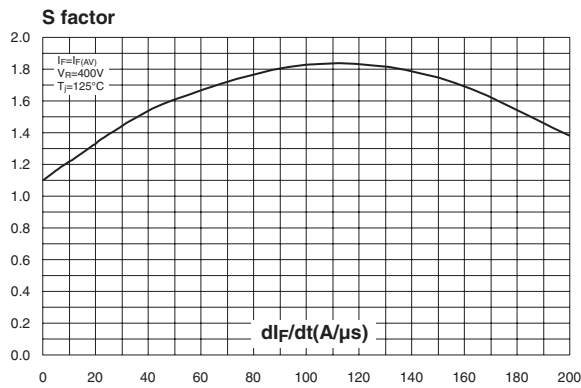
**Figure 5: Reverse recovery time versus  $dI_F/dt$  (typical values)**



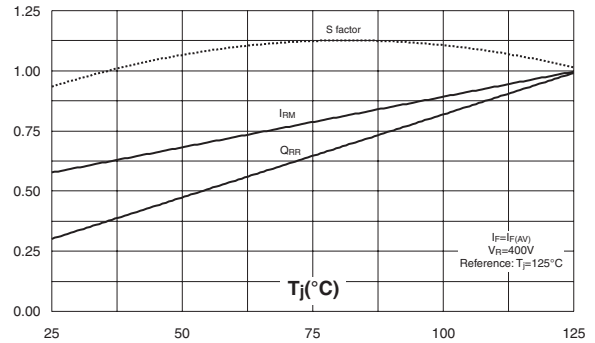
**Figure 6: Reverse recovery charges versus  $dI_F/dt$  (typical values)**



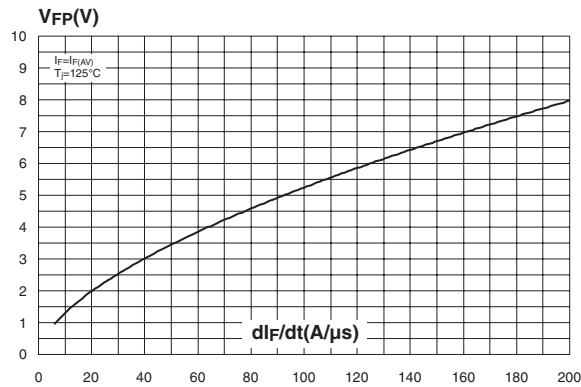
**Figure 7: Softness factor versus  $di_F/dt$  (typical values)**



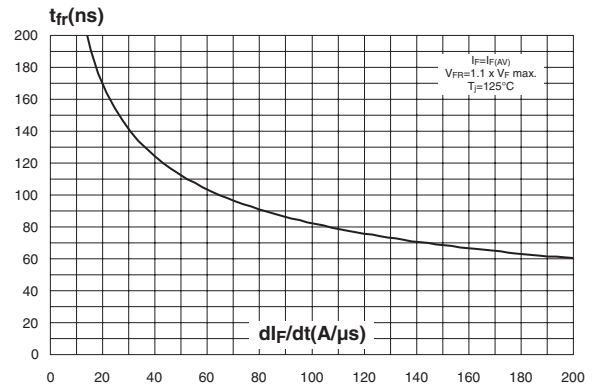
**Figure 8: Relative variations of dynamic parameters versus junction temperature**



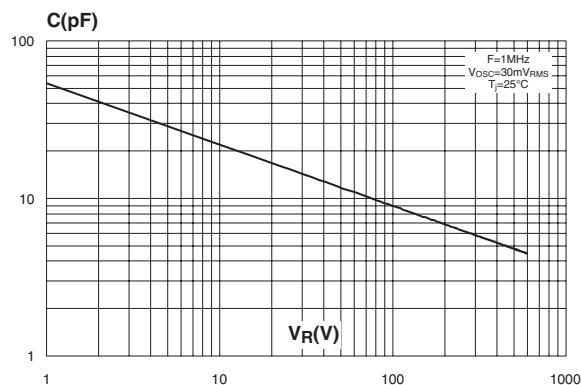
**Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values)**



**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)**

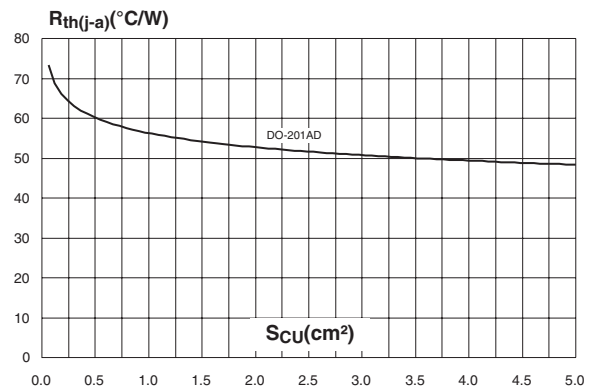


Figure 13: Thermal resistance junction to ambient versus copper surface under lead (epoxy FR4,  $e_{CU}=35\mu m$ ) (SMB / SMC)

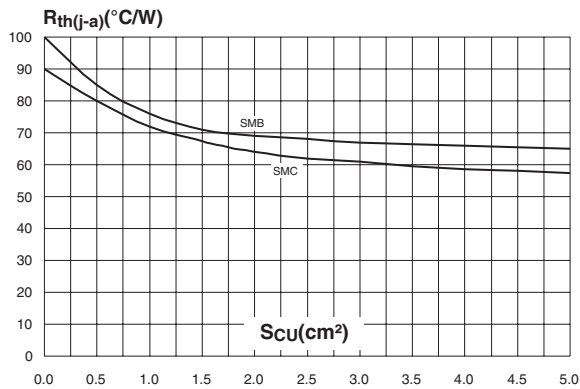


Figure 14: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4,  $e_{CU}=35\mu m$ ) (DPAK)

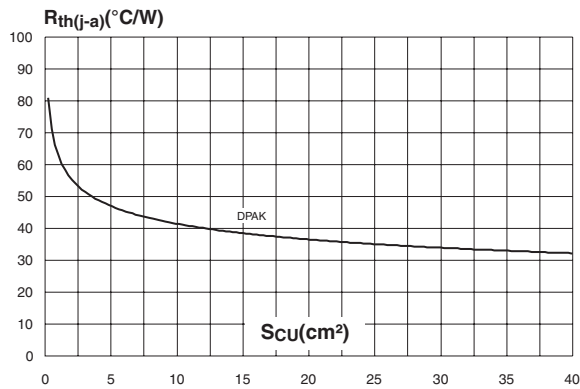


Figure 15: Thermal resistance versus lead length

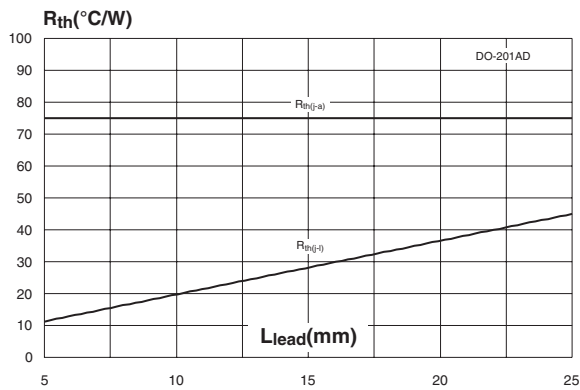


Figure 16: DPAK Package Mechanical Data

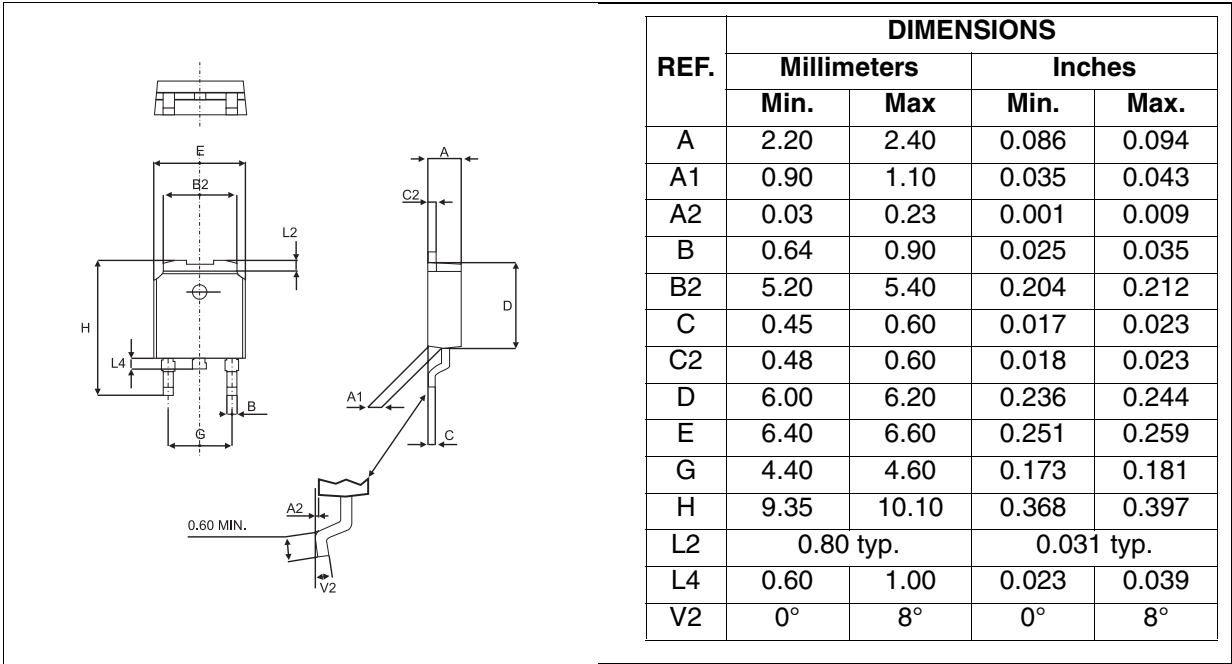
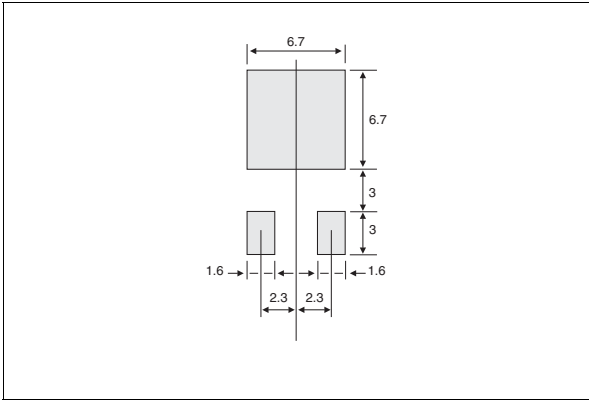


Figure 17: DPAK Foot Print Dimensions  
(in millimeters)



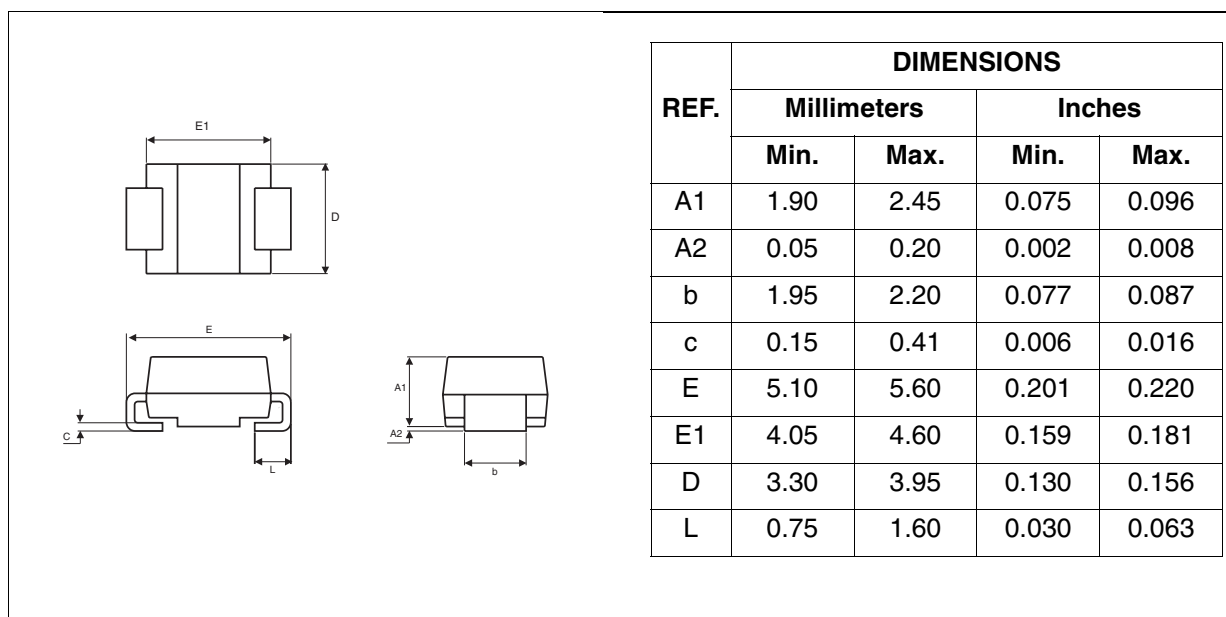
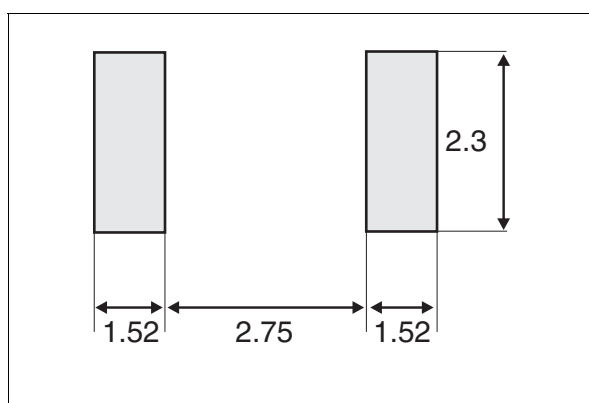
**Figure 18: SMB Package Mechanical Data****Figure 19: SMB Foot Print Dimensions**  
(in millimeters)

Figure 20: SMC Package Mechanical Data

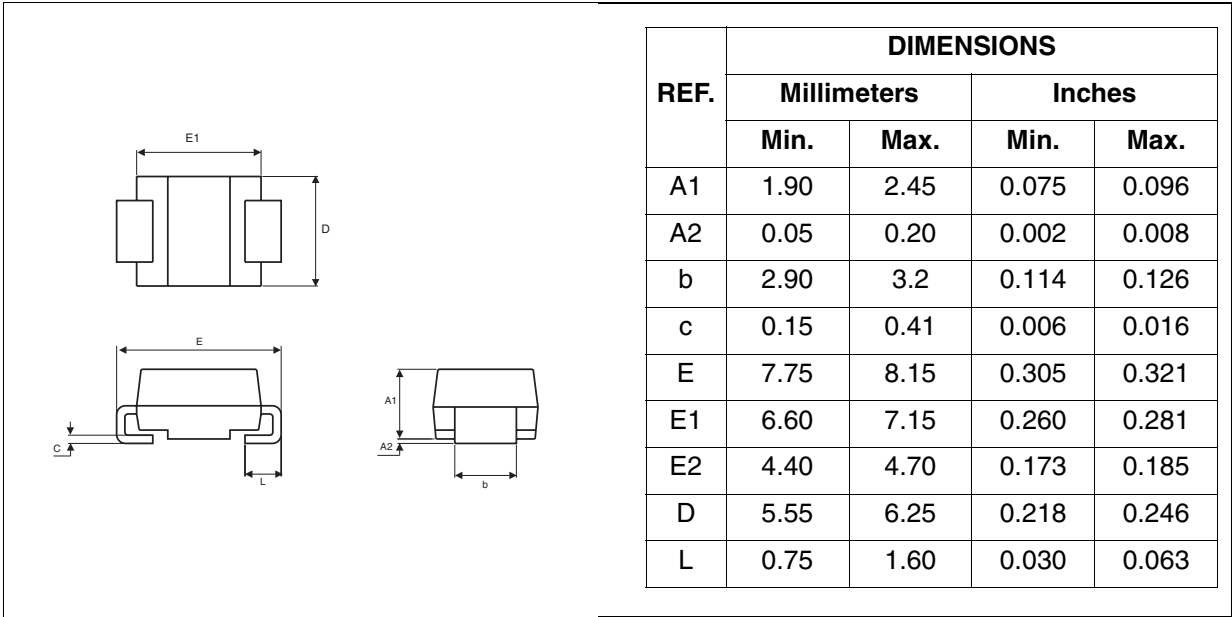


Figure 21: SMC Foot Print Dimensions  
(in millimeters)

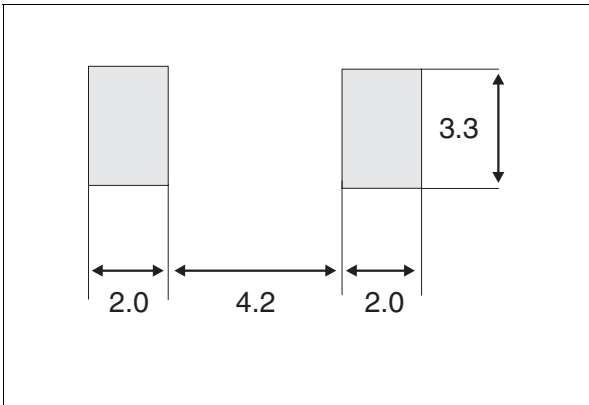
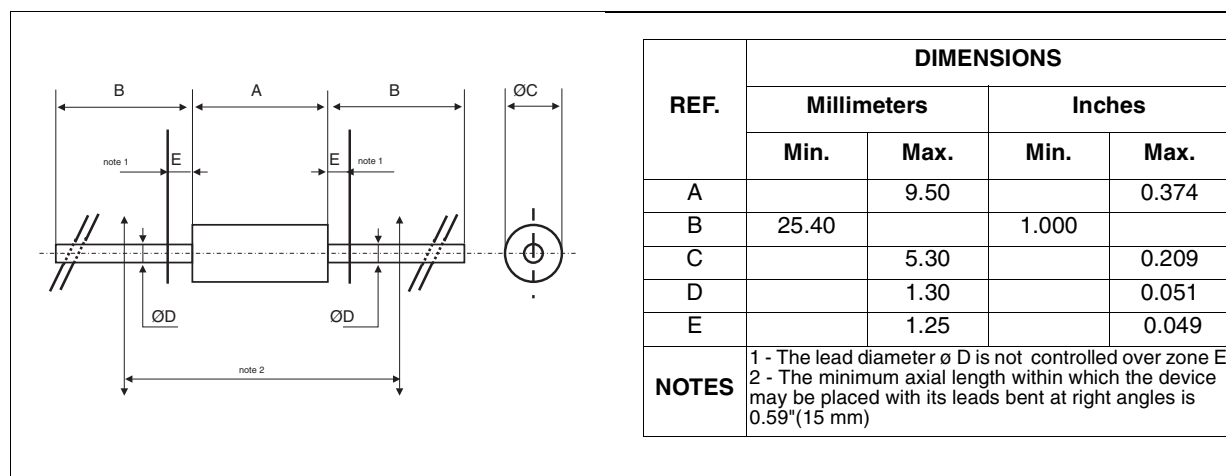




Figure 22: DO-201AD Package Mechanical Data



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 |
|---------------|-----------|----------|---------|----------|---------------|
| STTH3L06      | STTH3L06  | DO-201AD | 1.12 g  | 600      | Ammopack      |
| STTH3L06-RL   | STTH3L06  | DO-201AD | 1.12 g  | 1900     | Tape & reel   |
| STTH3L06B     | STTH3L06B | DPAK     | 0.3 g   | 75       | Tubel         |
| STTH3L06B-TR  | STTH3L06B | DPAK     | 0.3 g   | 2500     | Tape & reel   |
| STTH3L06U     | 3L6U      | SMB      | 0.11 g  | 2500     | Tape & reel   |
| STTH3L06S     | S06       | 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                                                      |
|--------------|----------|-----------------------------------------------------------------------------|
| October-2001 | 1        | First issue                                                                 |
| 07-Sep-2004  | 2        | SMB, SMC and DPAK packages added                                            |
| 14-Oct-2005  | 3        | Changed marking of STTH3L06U from 3L06U to 3L6U.<br>Added ECOPACK statement |

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