



## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

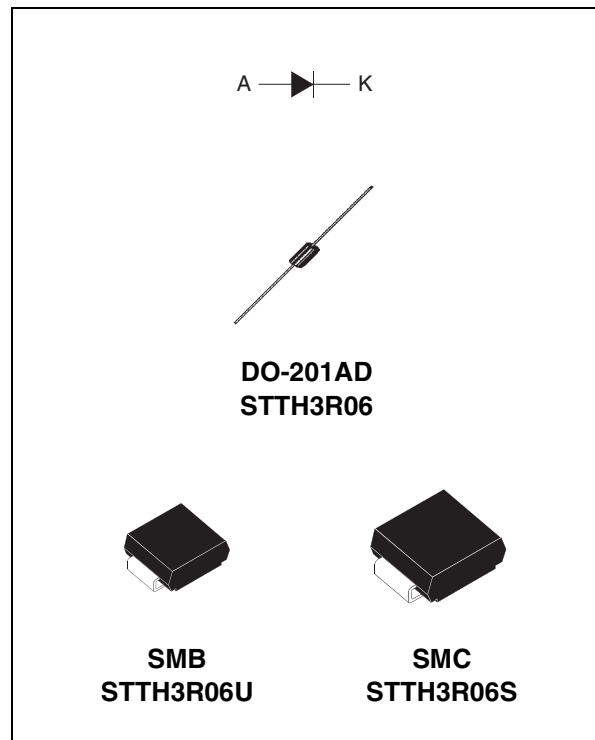
$I_{F(AV)}$	3 A
$V_{RRM}$	600 V
$I_R (max)$	100 $\mu$ A
$T_j$	175°C
$V_F (typ)$	1.0 V
$t_{rr} (typ)$	35 ns

### 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 $\delta = 0.5$	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**

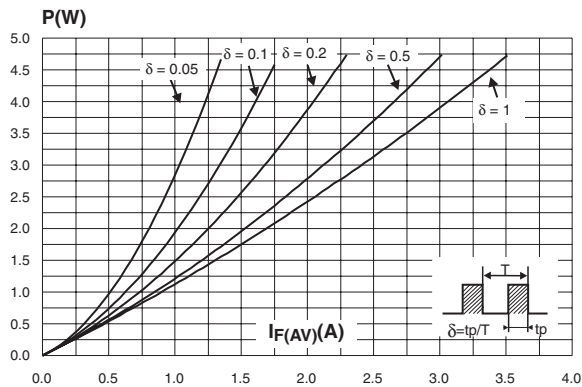
Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			3	$\mu\text{A}$
		$T_j = 150^\circ\text{C}$			15	100	
$V_F$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 3\text{A}$			1.7	V
		$T_j = 150^\circ\text{C}$			1.0	1.25	

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

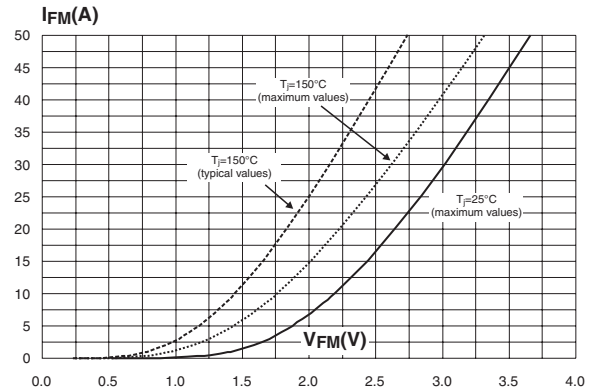
**Table 6: Dynamic Characteristics**

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

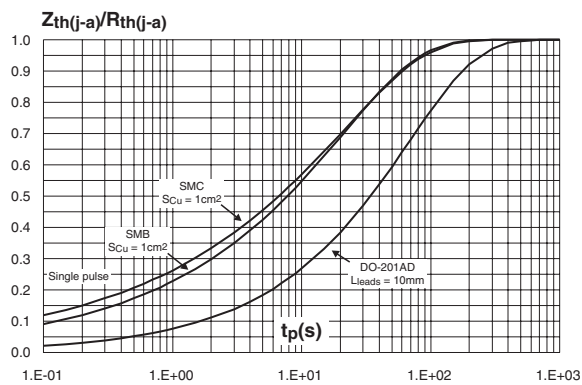
**Figure 1: Conduction losses versus average current**



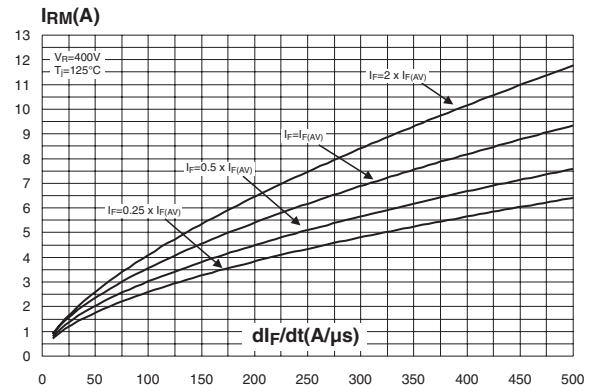
**Figure 2: Forward voltage drop versus forward current**



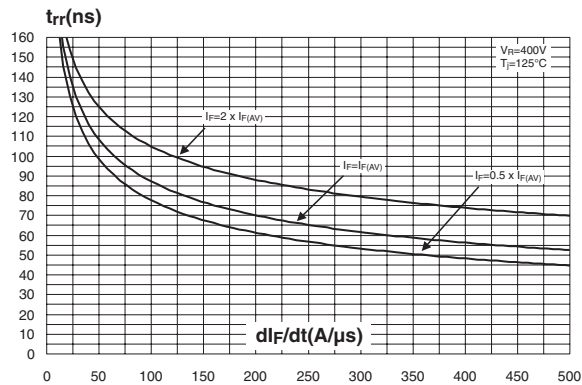
**Figure 3: Relative variation of thermal impedance junction ambient versus pulse duration (epoxy printed circuit FR4, L\_leads = 10mm, S\_CU=1cm²)**



**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)**

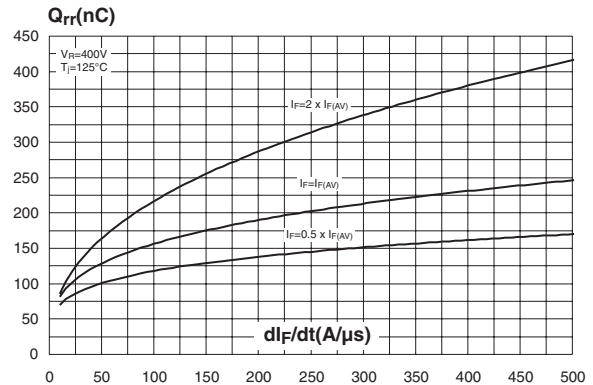


Figure 7: Softness factor versus  $di_F/dt$  (typical values)

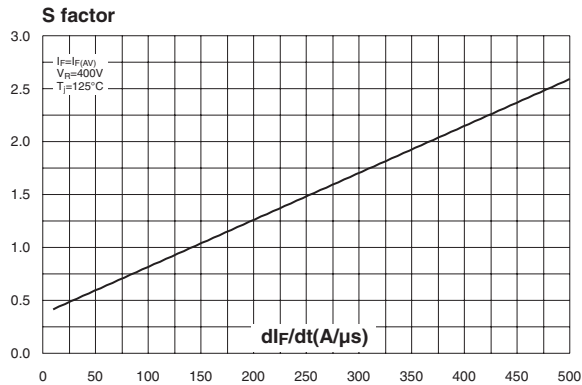


Figure 8: Relative variations of dynamic parameters versus junction temperature

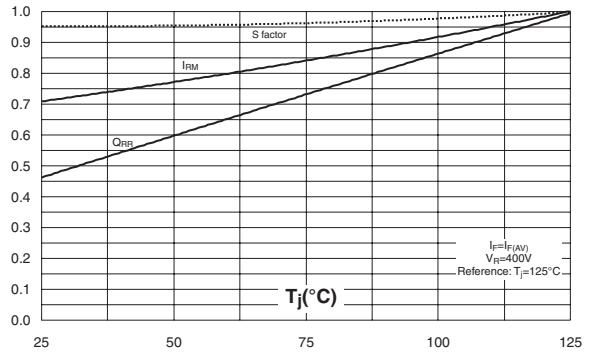


Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values)

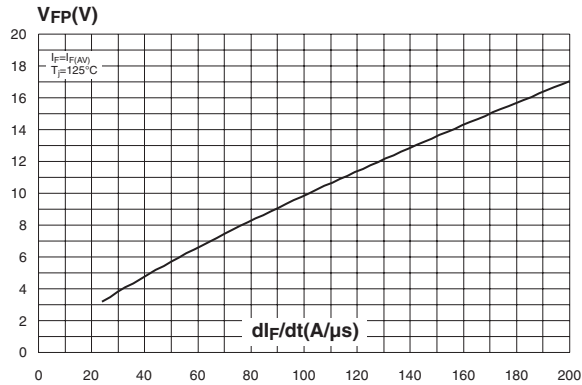


Figure 10: Forward recovery time versus  $di_F/dt$  (typical values)

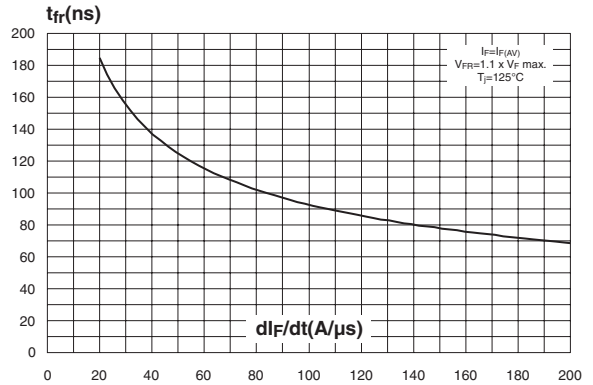


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

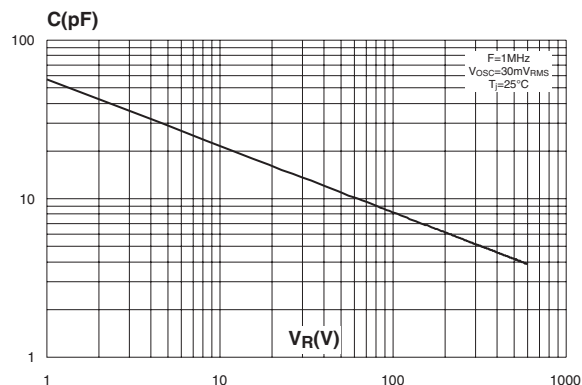
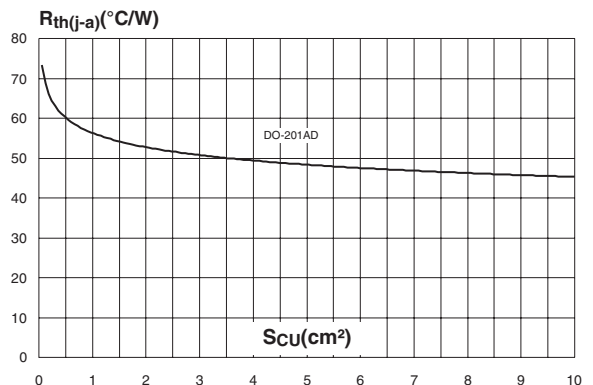
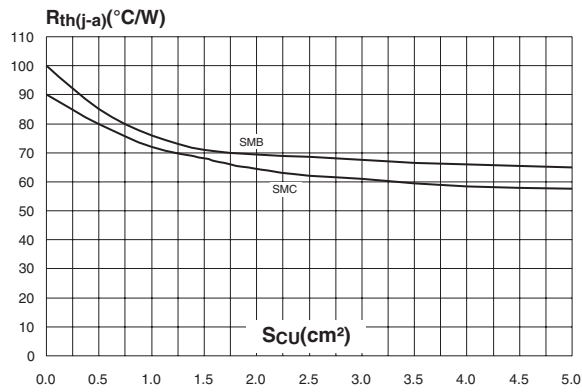


Figure 12: Thermal resistance junction to ambient versus copper surface under lead (epoxy FR4,  $e_{Cu} = 35\mu m$ ) (DO-201AD)



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



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

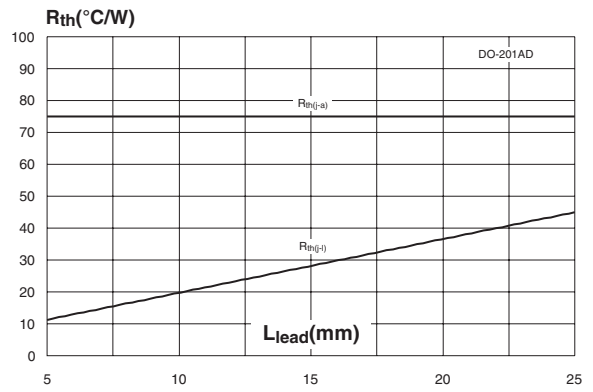


Figure 15: SMB Package Mechanical Data

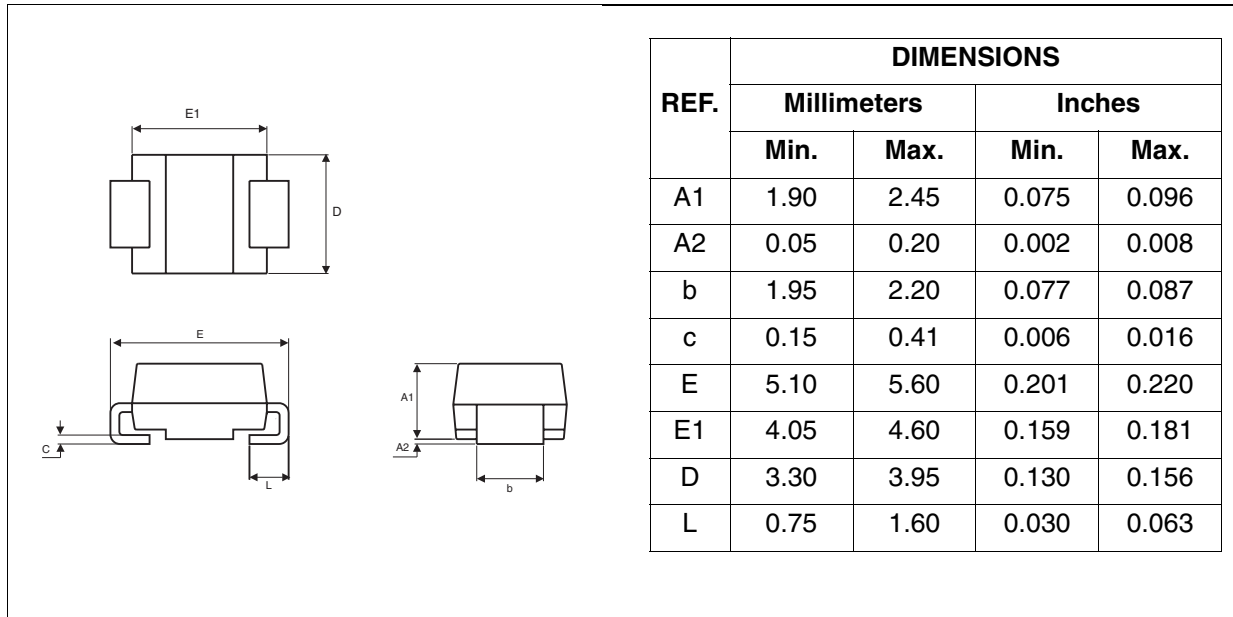


Figure 16: SMB Foot Print Dimensions  
(in millimeters)

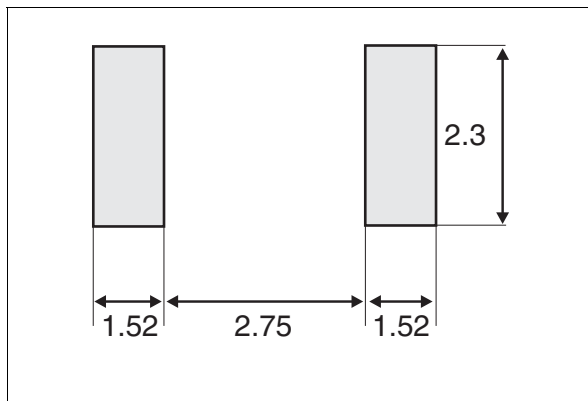


Figure 17: SMC Package Mechanical Data

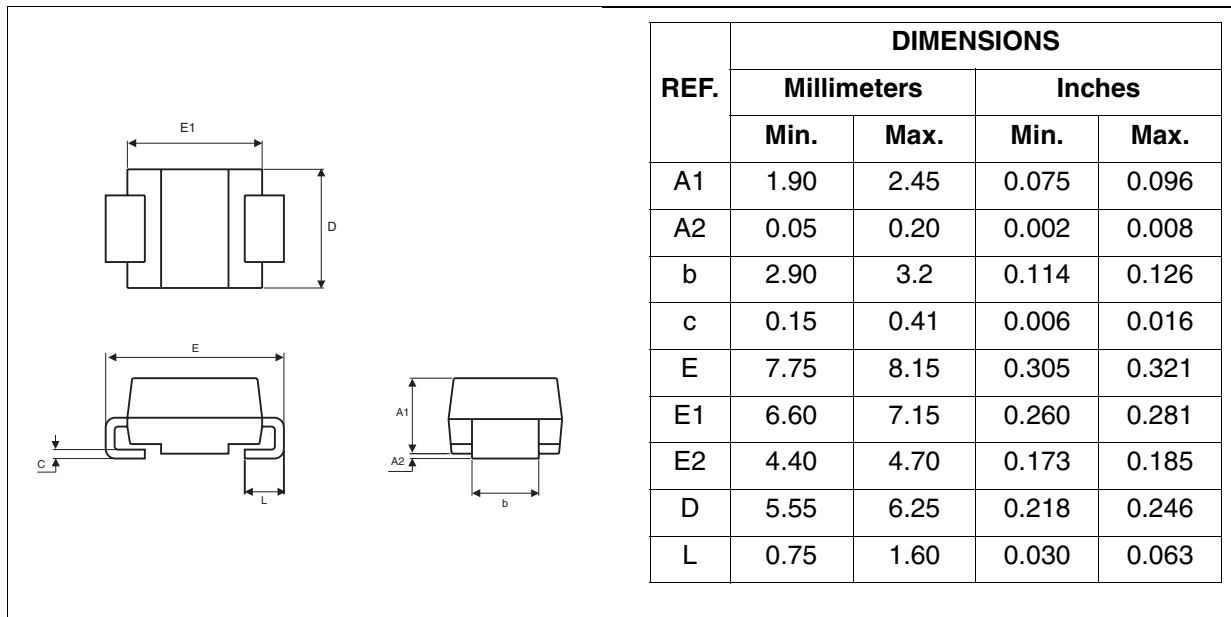
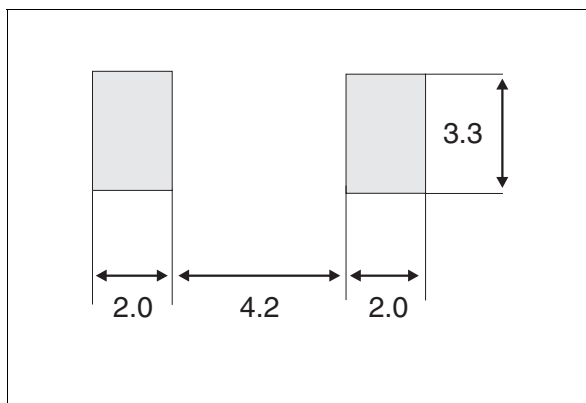
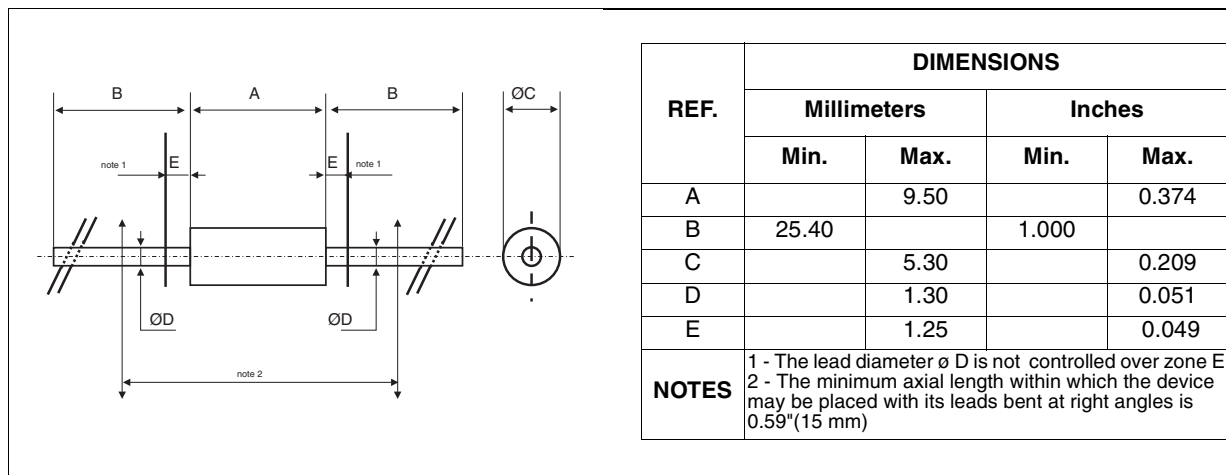
Figure 18: SMC Foot Print Dimensions  
(in millimeters)

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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