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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.

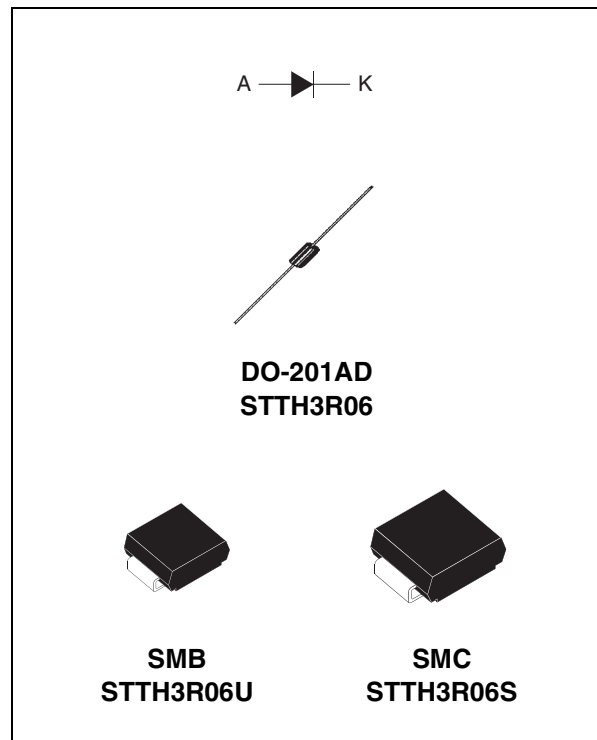


Table 2: Order Codes

Part Number	Marking
STTH3R06	STTH3R06
STTH3R06RL	STTH3R06
STTH3R06U	3R6U
STTH3R06S	R6S

STTH3R06

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

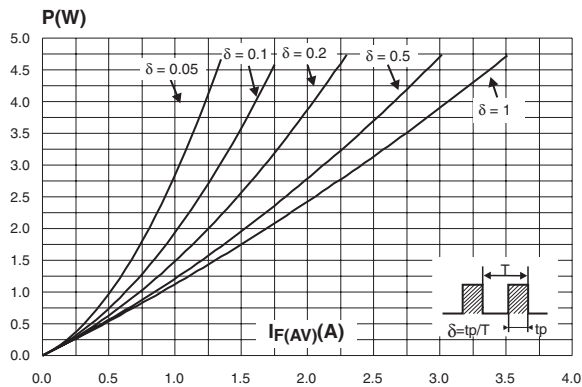


Figure 2: Forward voltage drop versus forward current

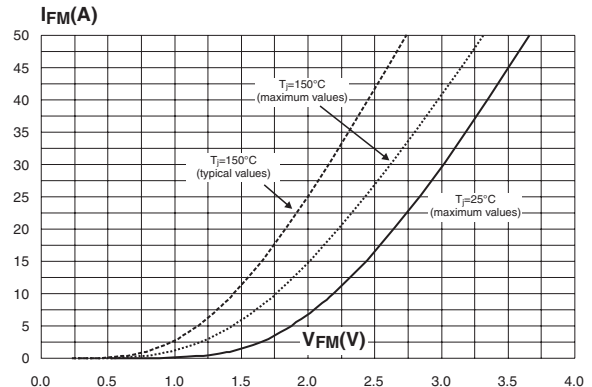


Figure 3: Relative variation of thermal impedance junction ambient versus pulse duration (epoxy printed circuit FR4, L_leads = 10mm, S_CU=1cm²)

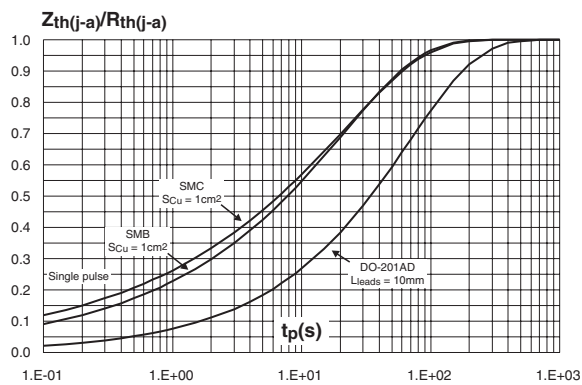


Figure 4: Peak reverse recovery current versus di_F/dt (typical values)

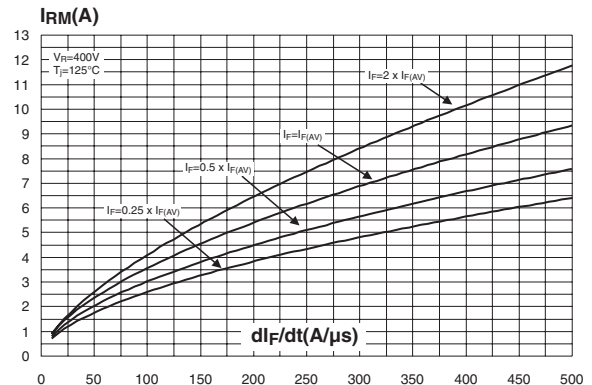


Figure 5: Reverse recovery time versus di_F/dt (typical values)

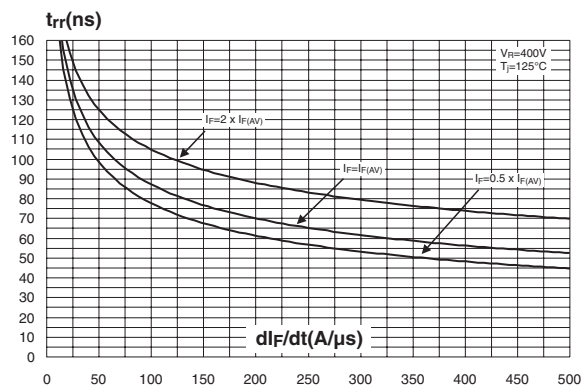


Figure 6: Reverse recovery charges versus di_F/dt (typical values)

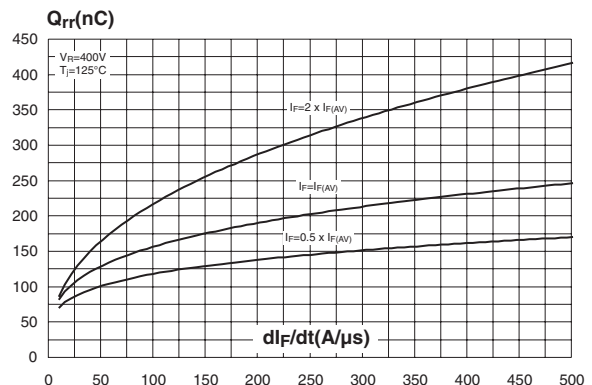


Figure 7: Softness factor versus di_F/dt (typical values)

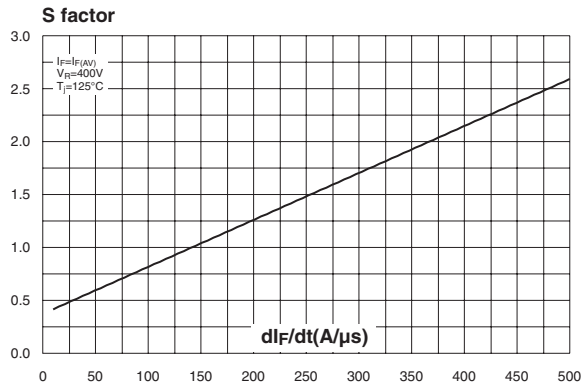


Figure 8: Relative variations of dynamic parameters versus junction temperature

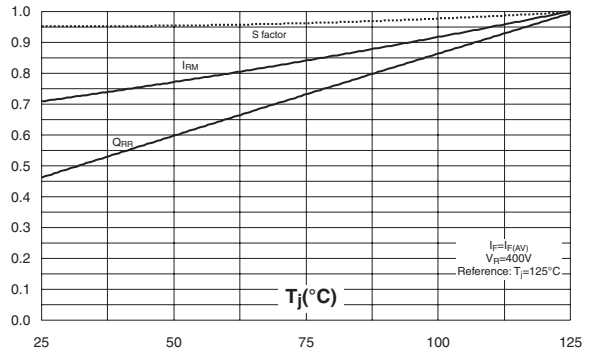


Figure 9: Transient peak forward voltage versus di_F/dt (typical values)

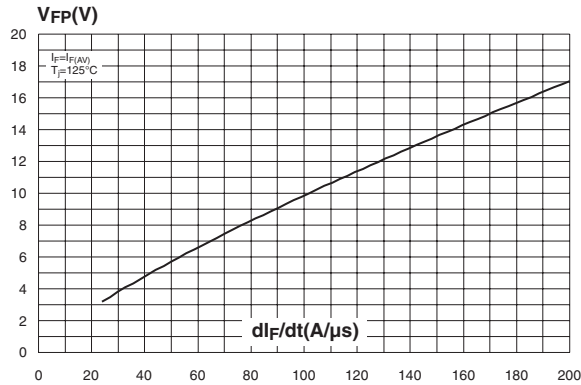


Figure 10: Forward recovery time versus di_F/dt (typical values)

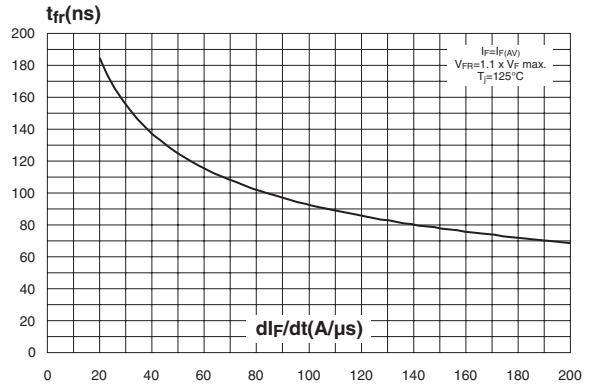


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

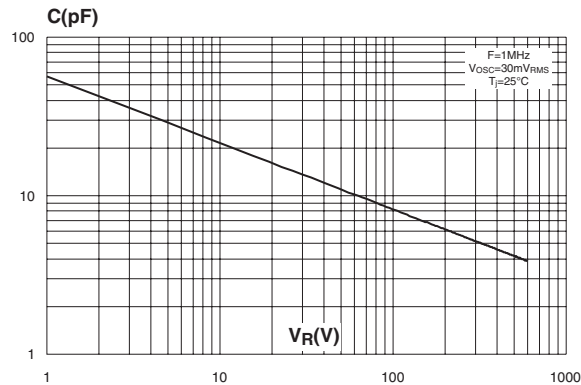


Figure 12: Thermal resistance junction to ambient versus copper surface under lead (epoxy FR4, $e_{CU} = 35\mu m$) (DO-201AD)

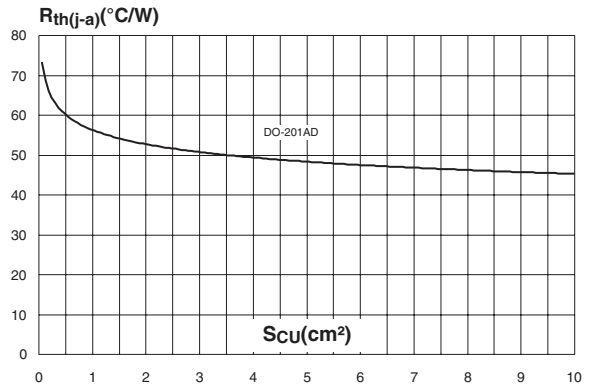


Figure 13: Thermal resistance junction to ambient versus copper surface under lead (epoxy FR4, $e_{CU}=35\mu\text{m}$) (SMB / SMC)

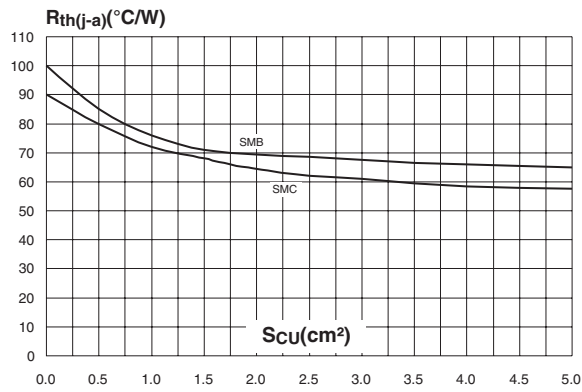


Figure 14: Thermal resistance versus lead length

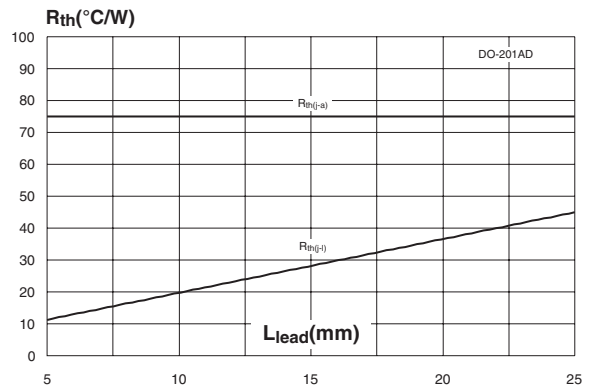


Figure 15: SMB Package Mechanical Data

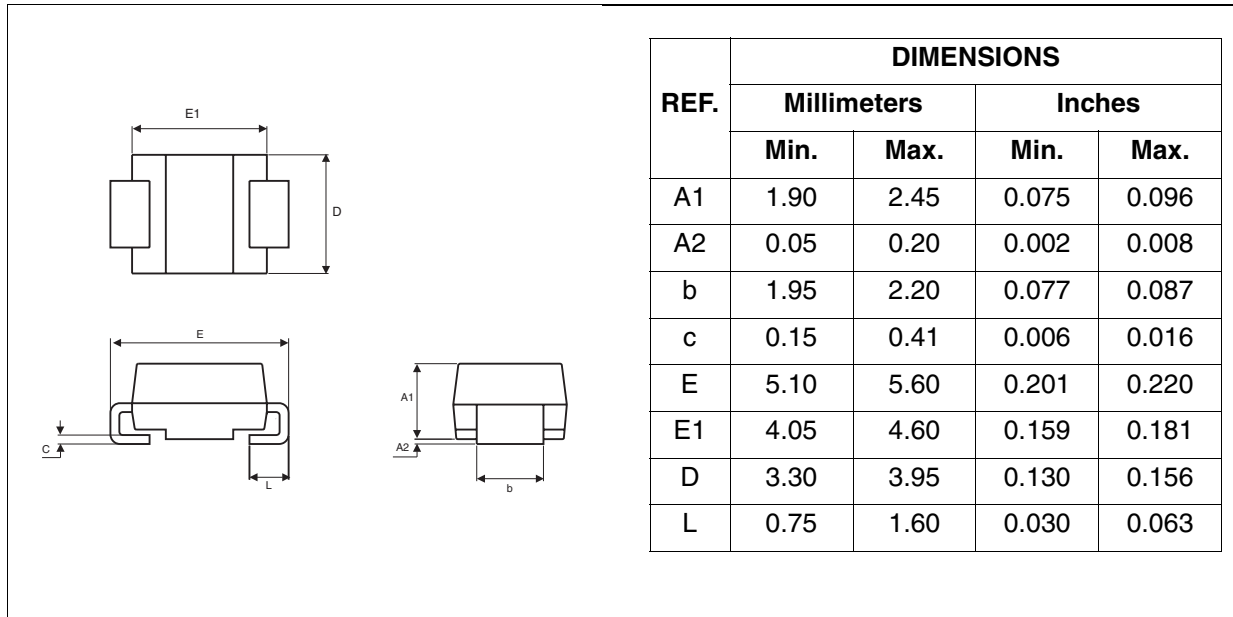


Figure 16: SMB Foot Print Dimensions
(in millimeters)

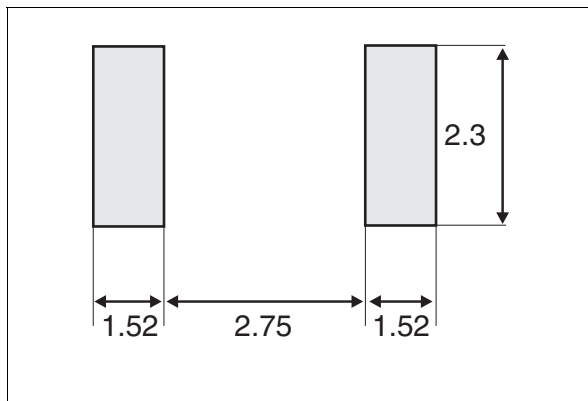
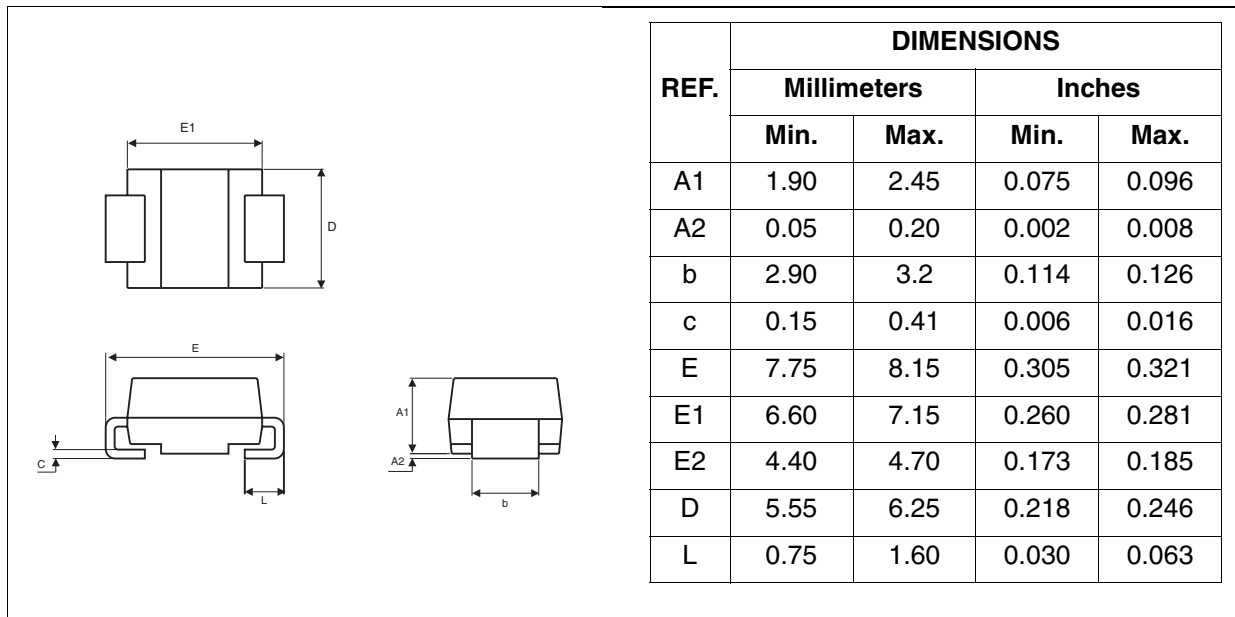
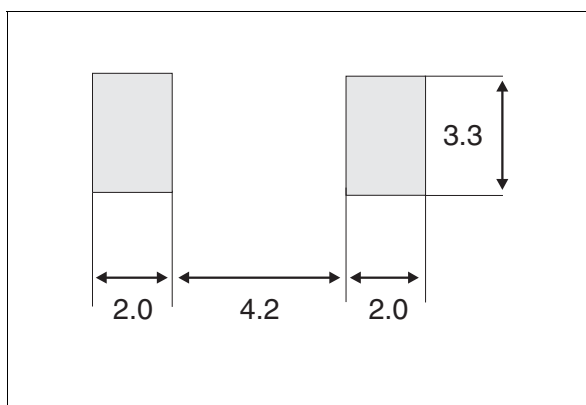
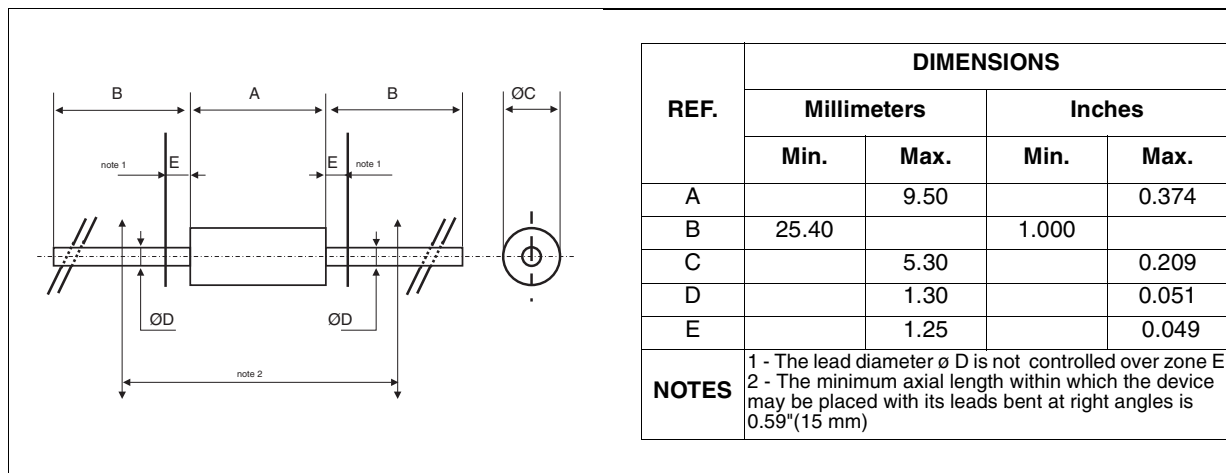


Figure 17: SMC Package Mechanical Data

Figure 18: SMC Foot Print Dimensions
(in millimeters)

STTH3R06

Figure 19: DO-201AD Package Mechanical Data



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.

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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