

## 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)

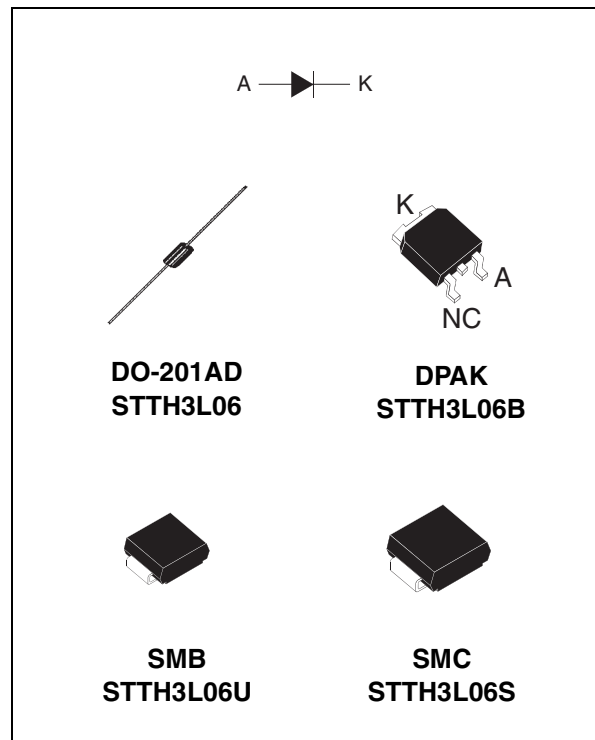
### DESCRIPTION

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 $\delta = 0.5$	DO-201AD	TI = 100°C	3	A
		DPAK	TI = 155°C		
		SMB	TI = 80°C		
		SMC	TI = 100°C		
$I_{FSM}$	Surge non repetitive forward current	DO-201AD	tp = 10ms sinusoidal	70	A
		SMB / SMC		60	
		DPAK		40	
$T_{stg}$	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**

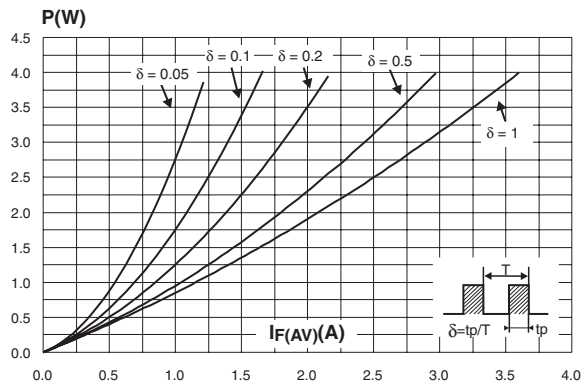
Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			3	$\mu\text{A}$
		$T_j = 150^\circ\text{C}$			15	100	
$V_F$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 3\text{A}$			1.3	V
		$T_j = 150^\circ\text{C}$			0.85	1.05	

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

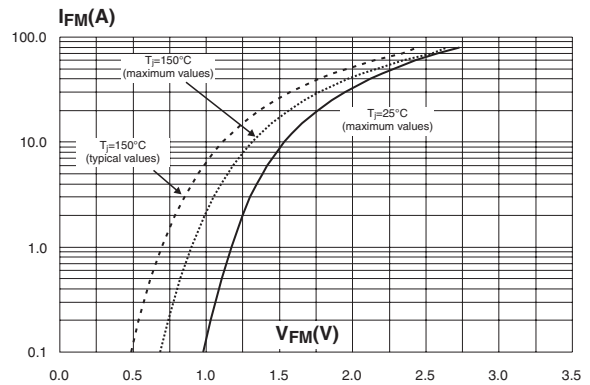
**Table 6: Dynamic Characteristics**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ\text{C}$	$I_F = 1\text{A}$ $di_F/dt = -50\text{ A}/\mu\text{s}$ $V_R = 30\text{V}$		60	85	ns
$t_{fr}$	Forward recovery time	$T_j = 25^\circ\text{C}$	$I_F = 3\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			100	ns
$V_{FP}$	Forward recovery voltage		$I_F = 3\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$			7.5	V

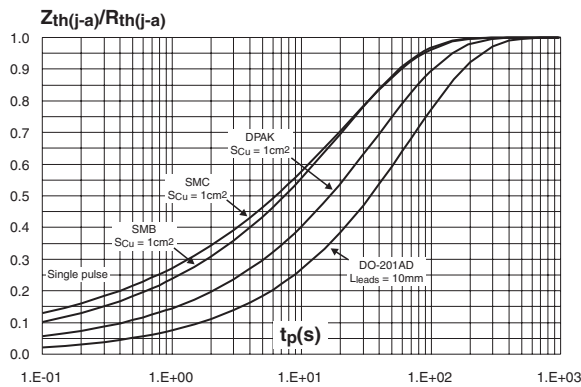
**Figure 1: Conduction losses versus average current**



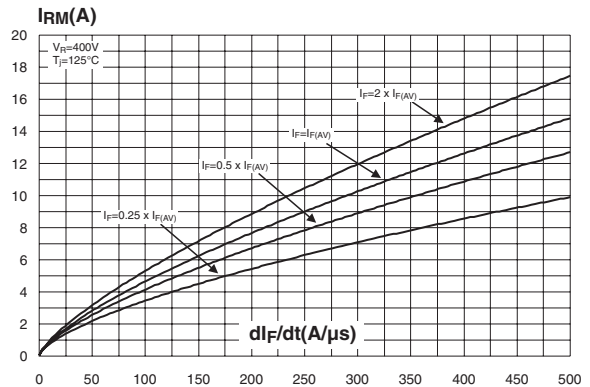
**Figure 2: Forward voltage drop versus forward current**



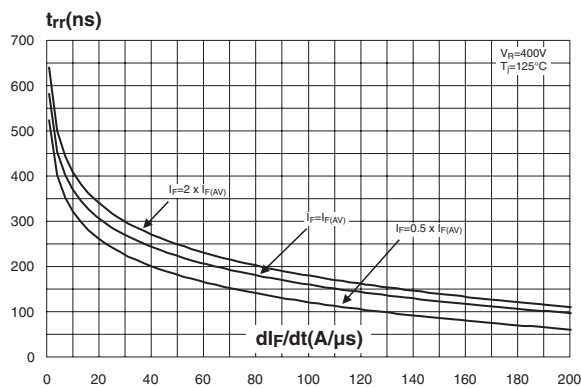
**Figure 3: Relative variation of thermal impedance junction ambient versus pulse duration (epoxy printed circuit FR4, L\_leads = 10mm, S\_CU=1cm²)**



**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)**

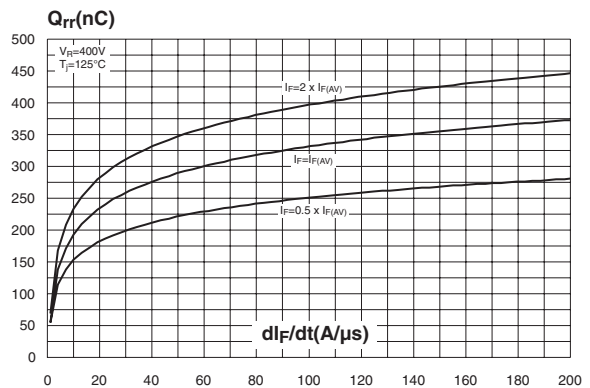


Figure 7: Softness factor versus  $di_F/dt$  (typical values)

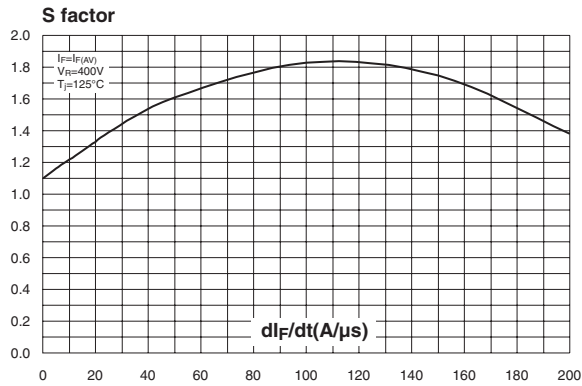


Figure 8: Relative variations of dynamic parameters versus junction temperature

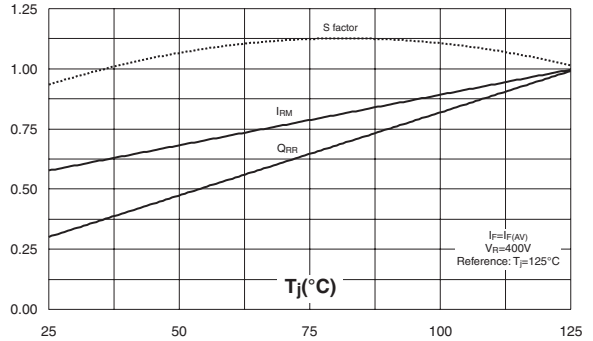


Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values)

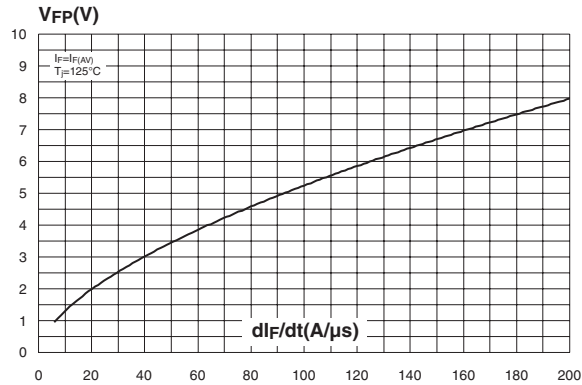


Figure 10: Forward recovery time versus  $di_F/dt$  (typical values)

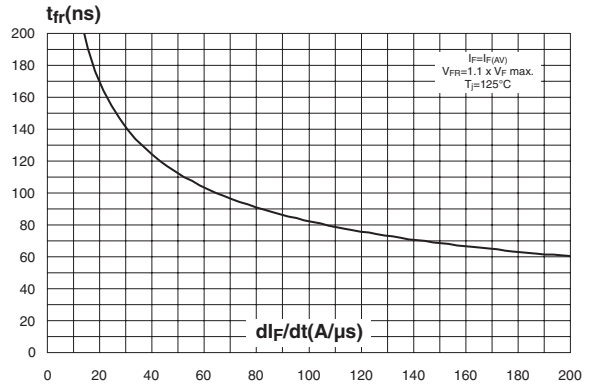


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

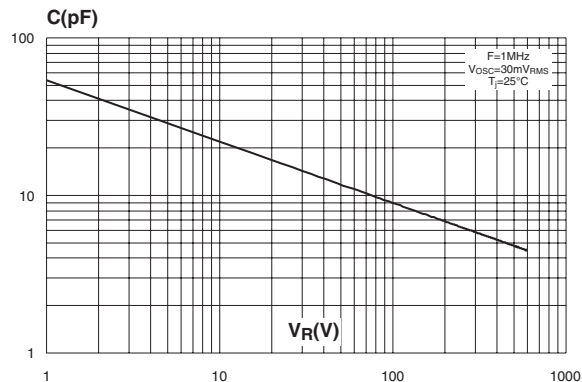
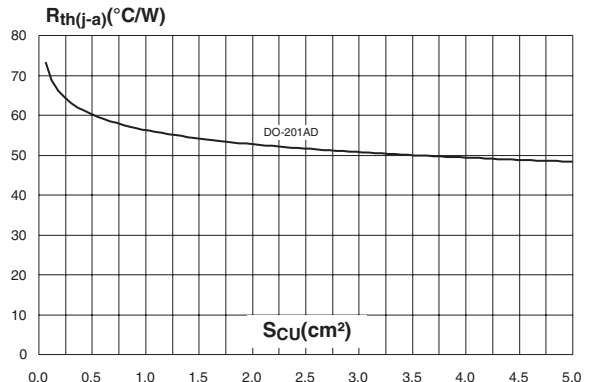
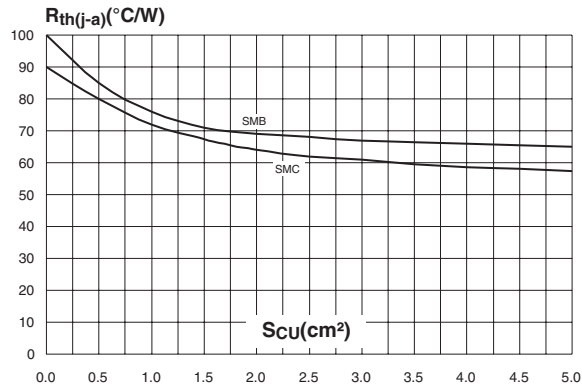


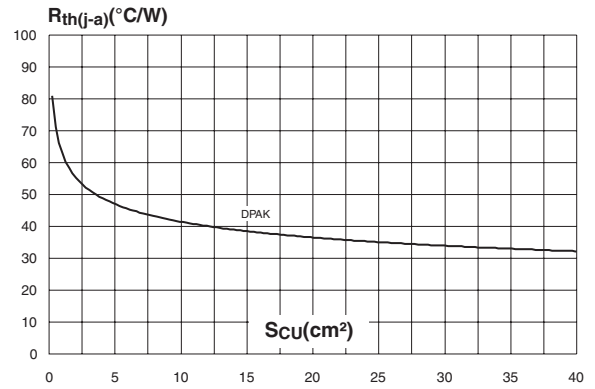
Figure 12: Thermal resistance junction to ambient versus copper surface under lead (epoxy FR4,  $e_{CU} = 35\mu m$ ) (DO-201AD)



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



**Figure 15: Thermal resistance versus lead length**

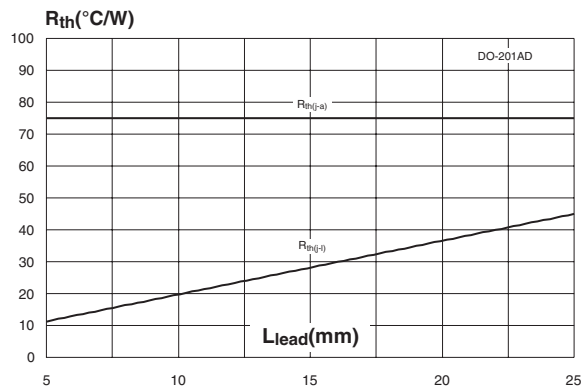


Figure 16: DPAK Package Mechanical Data

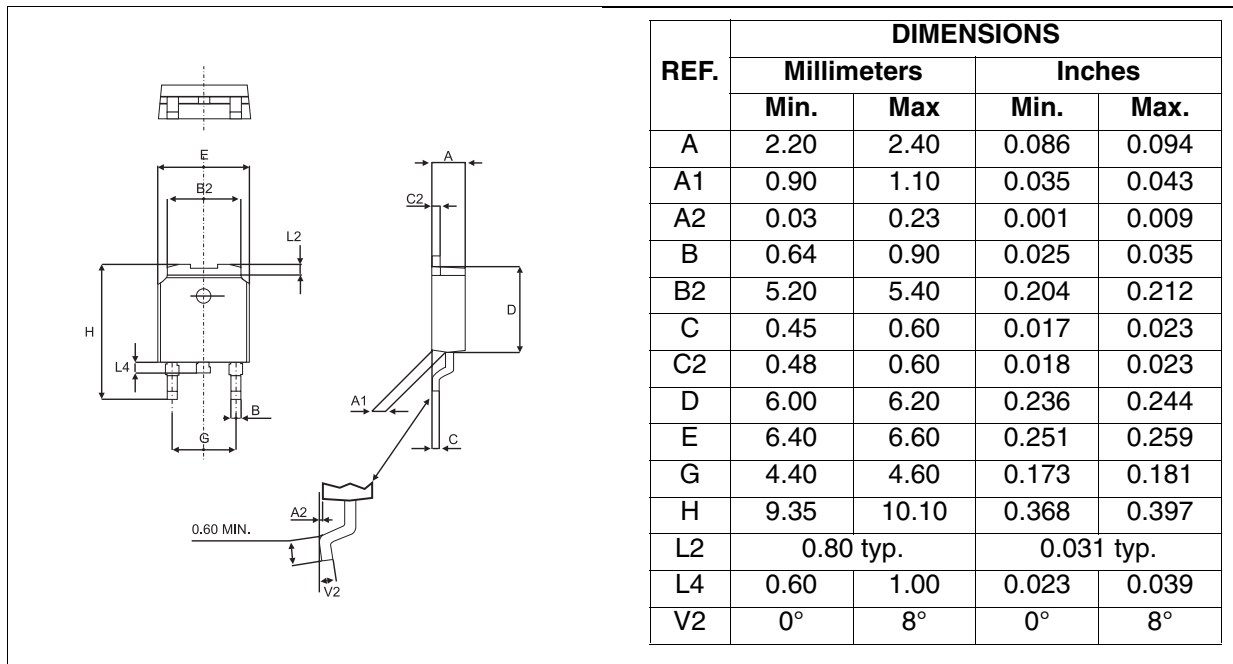


Figure 17: DPAK Foot Print Dimensions (in millimeters)

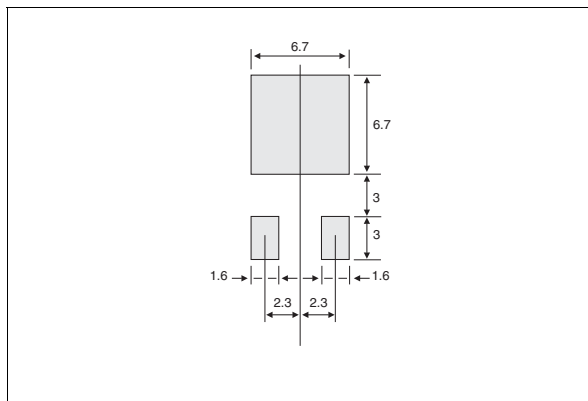


Figure 18: SMB Package Mechanical Data

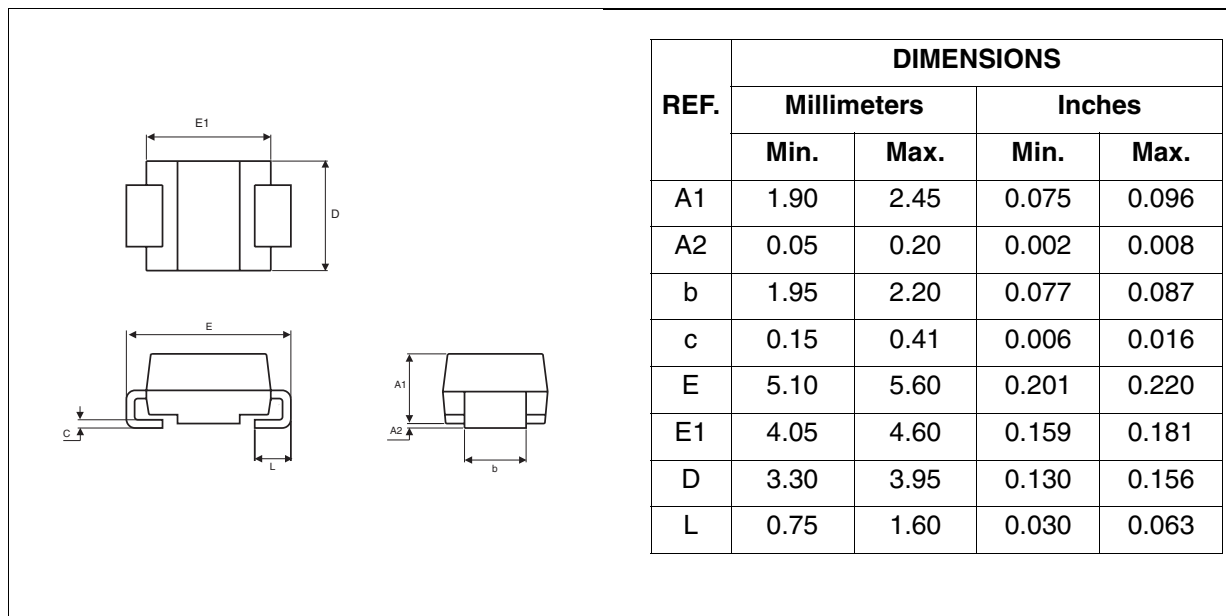
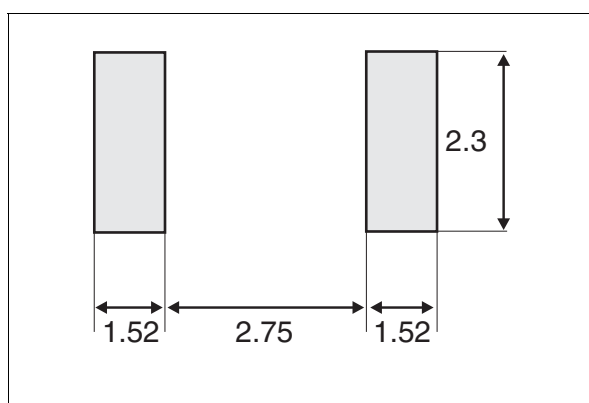
Figure 19: SMB Foot Print Dimensions  
(in millimeters)

Figure 20: SMC Package Mechanical Data

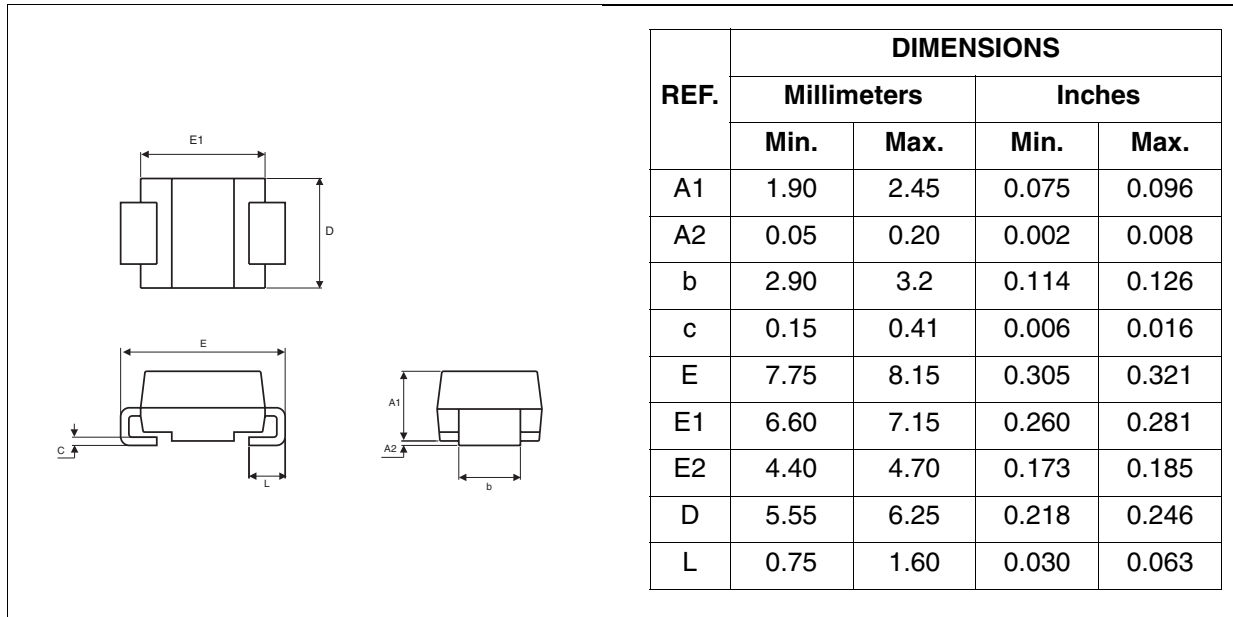


Figure 21: SMC Foot Print Dimensions  
(in millimeters)

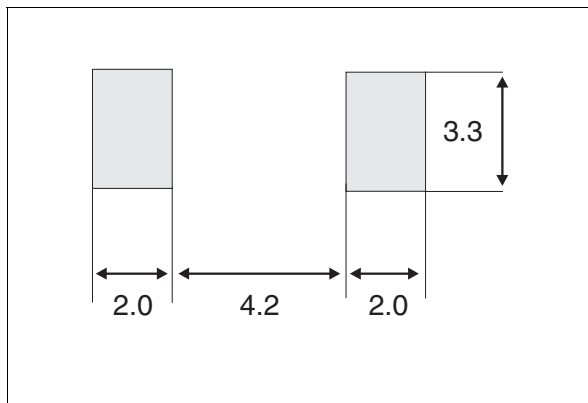
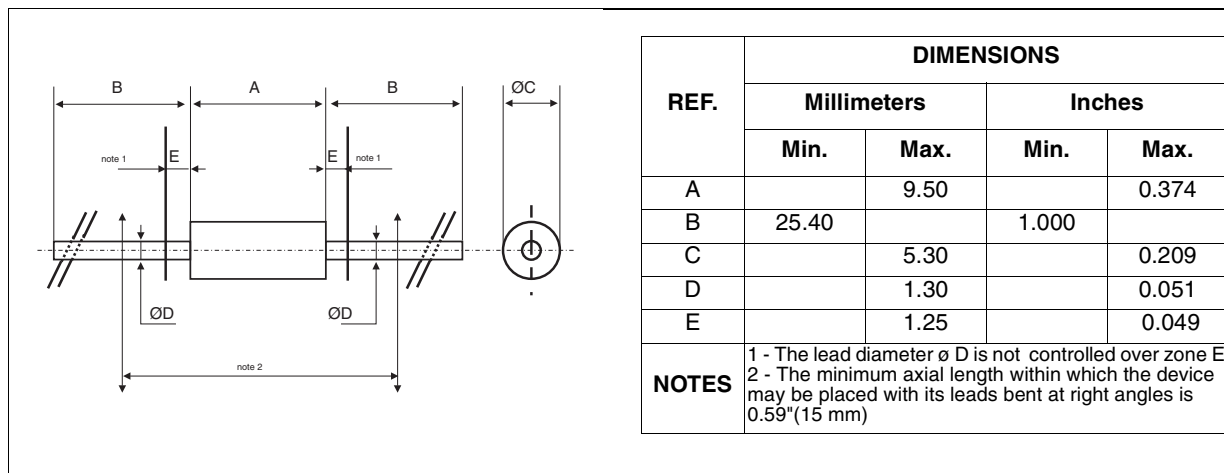




Figure 22: DO-201AD Package Mechanical Data



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. Added ECOPACK statement

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