

## TURBO 2 ULTRAFast HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

$I_{F(AV)}$	1 A
$V_{RRM}$	600 V
$I_R (max)$	75 $\mu$ A
$T_j$	175°C
$V_F (typ)$	1.0 V
$t_{rr} (max)$	25 ns

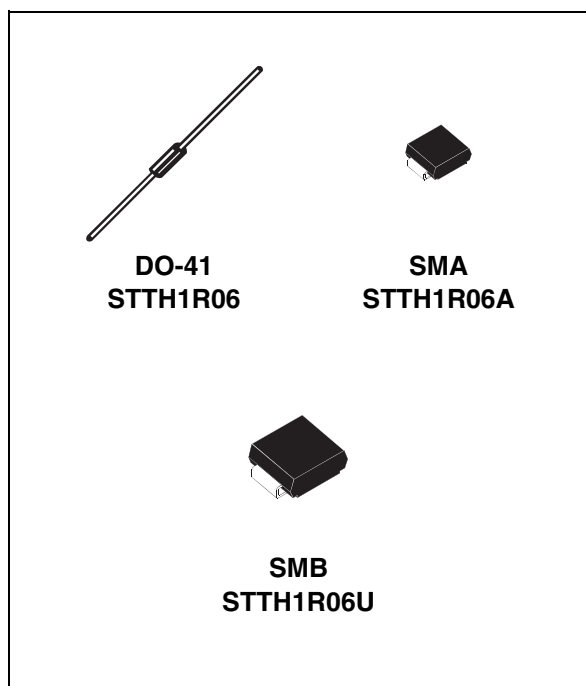
### FEATURES AND BENEFITS

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching & conduction losses

### DESCRIPTION

The STTH1R06, which is using ST Turbo 2 600V technology, is specially suited as boost diode in power factor correction circuitry.

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



**Table 2: Order Codes**

Part Number	Marking
STTH1R06	STTH1R06
STTH1R06RL	STTH1R06

Part Number	Marking
STTH1R06A	HR6
STTH1R06U	BR6

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

Symbol	Parameter			Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage			600	V
I <sub>F(RMS)</sub>	RMS forward voltage	DO-41		10	A
		SMA / SMB		7	
I <sub>F(AV)</sub>	Average forward current	DO-41	T <sub>c</sub> = 100°C    δ = 0.5	1	A
		SMA	T <sub>c</sub> = 125°C    δ = 0.5		
		SMB	T <sub>c</sub> = 135°C    δ = 0.5		
I <sub>FSM</sub>	Surge non repetitive forward current	DO-41	tp = 10ms sinusoidal	25	A
		SMA / SMB		20	
T <sub>stg</sub>	Storage temperature range			-65 to + 175	°C
T <sub>j</sub>	Maximum operating junction temperature			175	°C

Table 4: Thermal Resistance

Symbol	Parameter			Value (max).	Unit
$R_{th(j-l)}$	Junction to lead	L = 10mm	DO-41	45	°C/W
			SMA	30	
			SMB	25	
$R_{th(j-a)}$	Junction to ambient <sup>(1)</sup>	L = 10mm	DO-41	70	°C/W

Note 1:  $R_{th(j-a)}$  is measured with a copper area  $S = Scm^2$  (see figure12).

Table 5: Static Electrical Characteristics

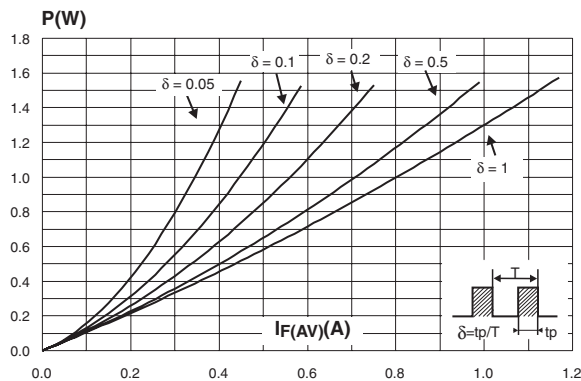
Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R$	Reverse leakage current	$T_j = 25^\circ C$	$V_R = V_{RRM}$			1	$\mu A$
		$T_j = 150^\circ C$			10	75	
$V_F$	Forward voltage drop	$T_j = 25^\circ C$	$I_F = 1A$			1.7	V
		$T_j = 150^\circ C$			1.0	1.25	

To evaluate the conduction losses use the following equation:  $P = 1.03 \times I_{F(AV)} + 0.27 I_F^2 (RMS)$

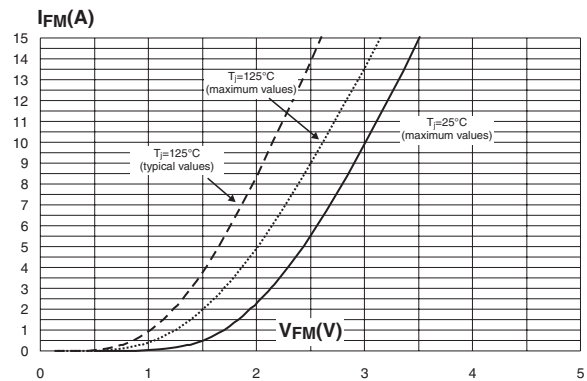
Table 6: Dynamic Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ C$	$I_F = 0.5A \quad I_{rr} = 0.25A \quad I_R = 1A$			25	ns
			$I_F = 1A \quad dI_F/dt = -50 A/\mu s \quad V_R = 30V$		30	45	
$t_{fr}$	Forward recovery time	$T_j = 25^\circ C$	$I_F = 1A \quad dI_F/dt = 100 A/\mu s$ $V_{FR} = 1.1 \times V_{Fmax}$			100	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25^\circ C$	$I_F = 1A \quad dI_F/dt = 100 A/\mu s$ $V_{FR} = 1.1 \times V_{Fmax}$			10	V

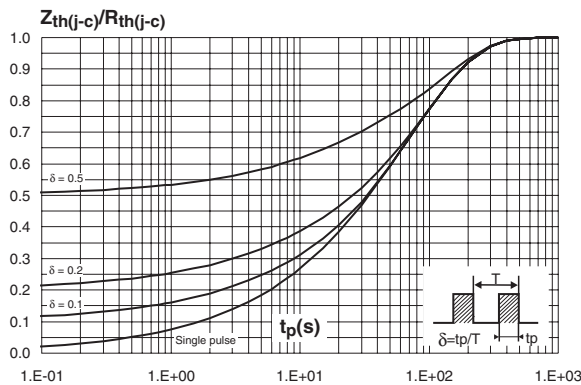
**Figure 1: Conduction losses versus average forward current**



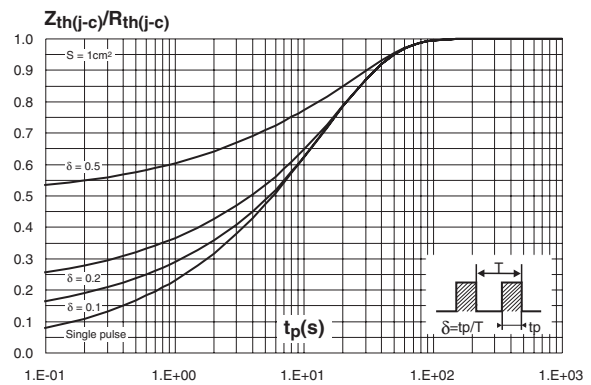
**Figure 2: Forward voltage drop versus forward current**



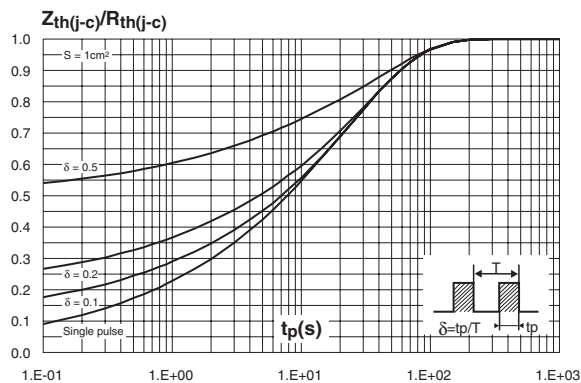
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (DO-41)**



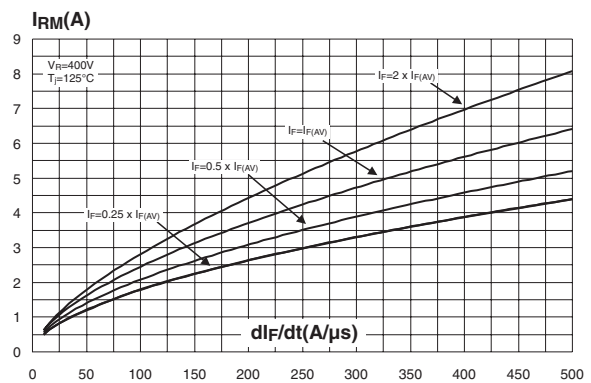
**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (SMA)**



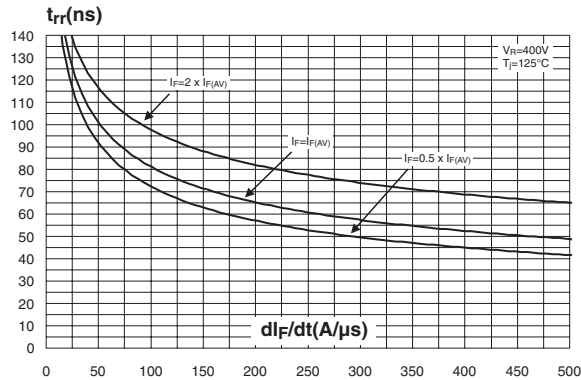
**Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (SMB)**



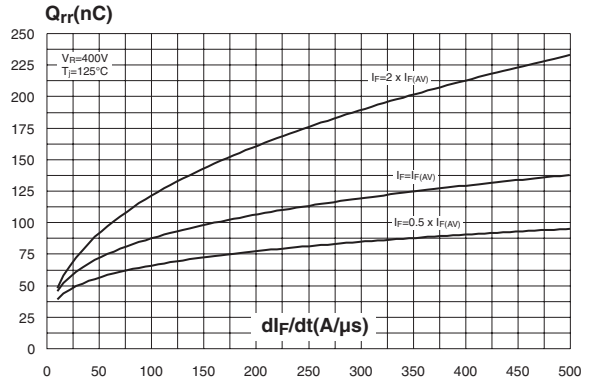
**Figure 6: Peak reverse recovery current versus  $dI_F/dt$  (typical values)**



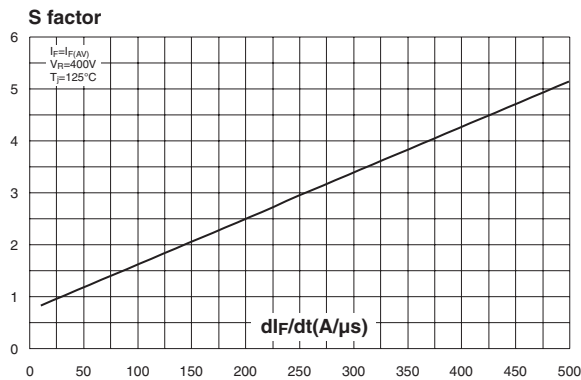
**Figure 7: Reverse recovery time versus  $di_F/dt$  (typical values)**



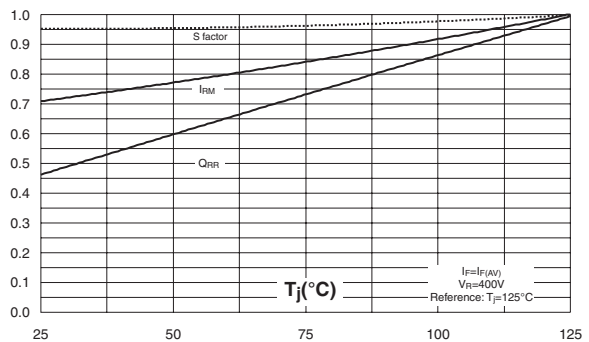
**Figure 8: Reverse recovery charges versus  $di_F/dt$  (typical values)**



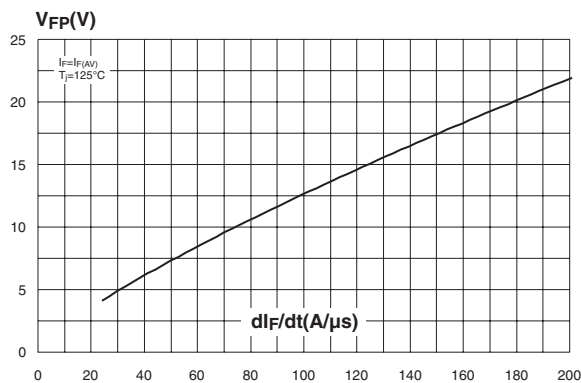
**Figure 9: Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



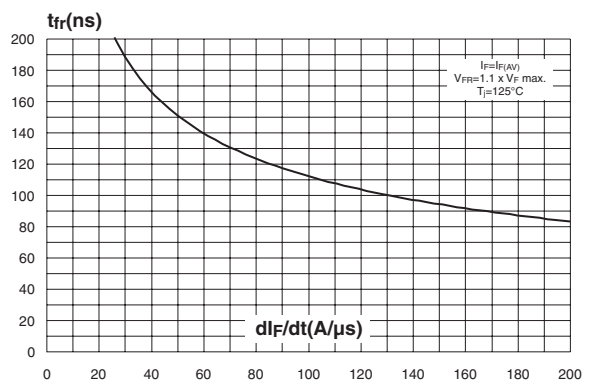
**Figure 10: Relative variations of dynamic parameters versus junction temperature**



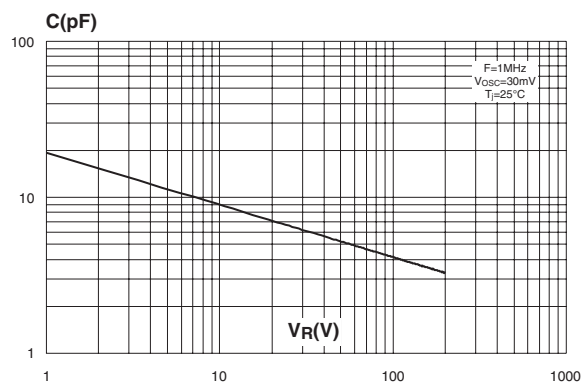
**Figure 11: Transient peak forward voltage versus  $di_F/dt$  (typical values)**



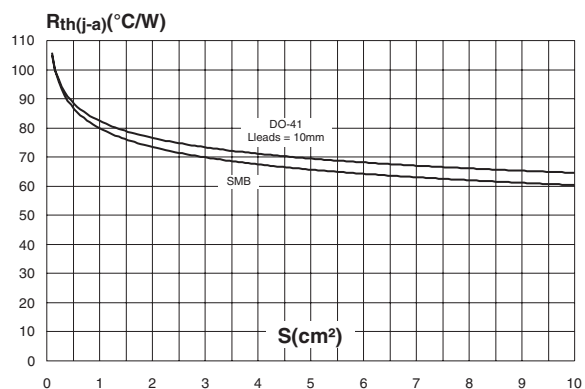
**Figure 12: Forward recovery time versus  $di_F/dt$  (typical values)**



**Figure 13: Junction capacitance versus reverse voltage applied (typical values)**



**Figure 14: Thermal resistance junction to ambient versus copper surface under each lead (epoxy FR4,  $e_{CU}=35\mu\text{m}$ ) (DO-41, SMB)**



**Figure 15: Thermal resistance junction to ambient versus copper surface under each lead (epoxy FR4,  $e_{CU}=35\mu\text{m}$ ) (SMA)**

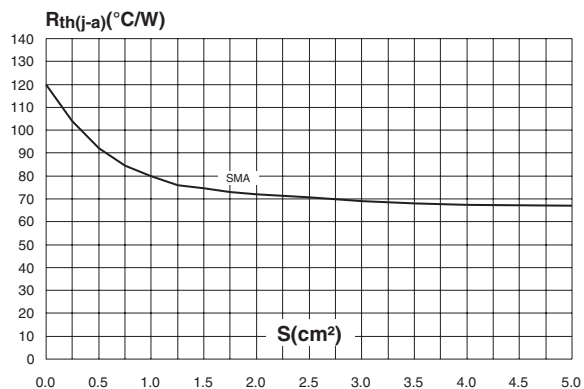


Figure 16: SMA Package Mechanical Data

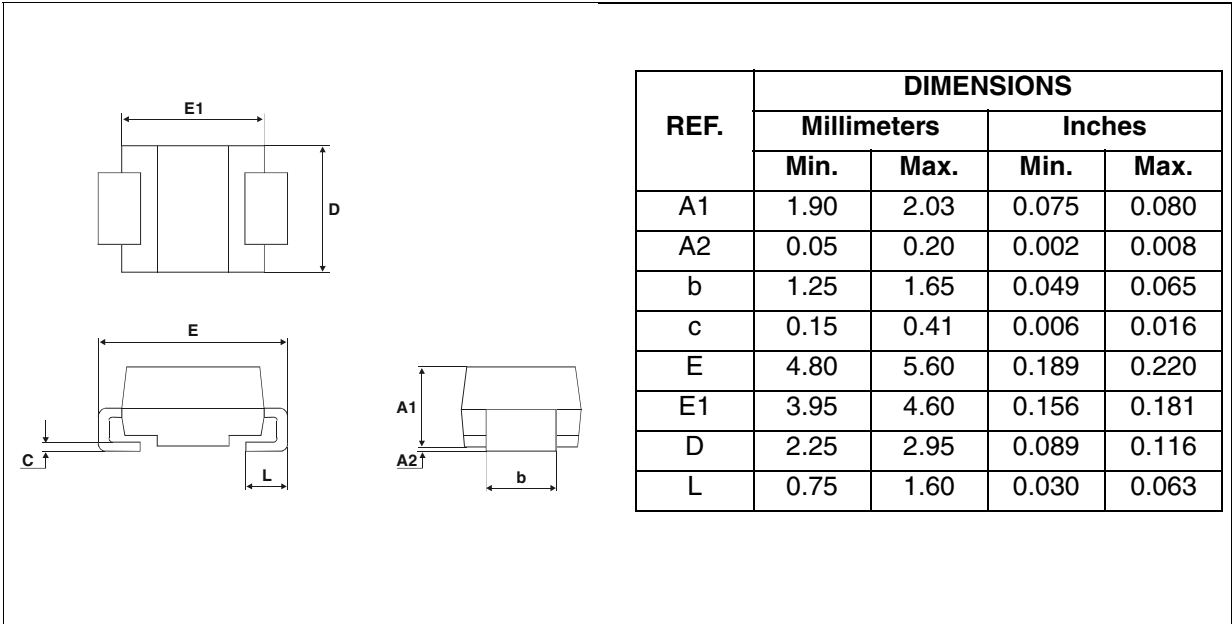
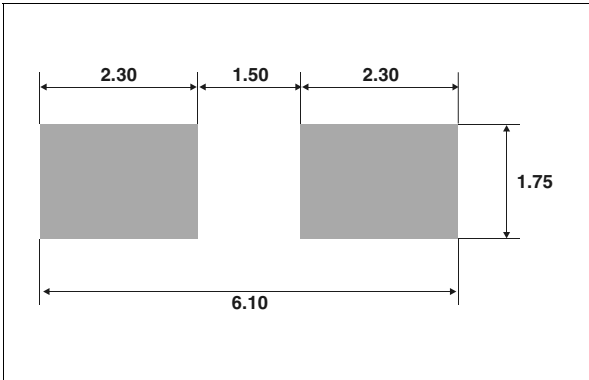


Figure 17: SMA Foot Print Dimensions  
(in millimeters)



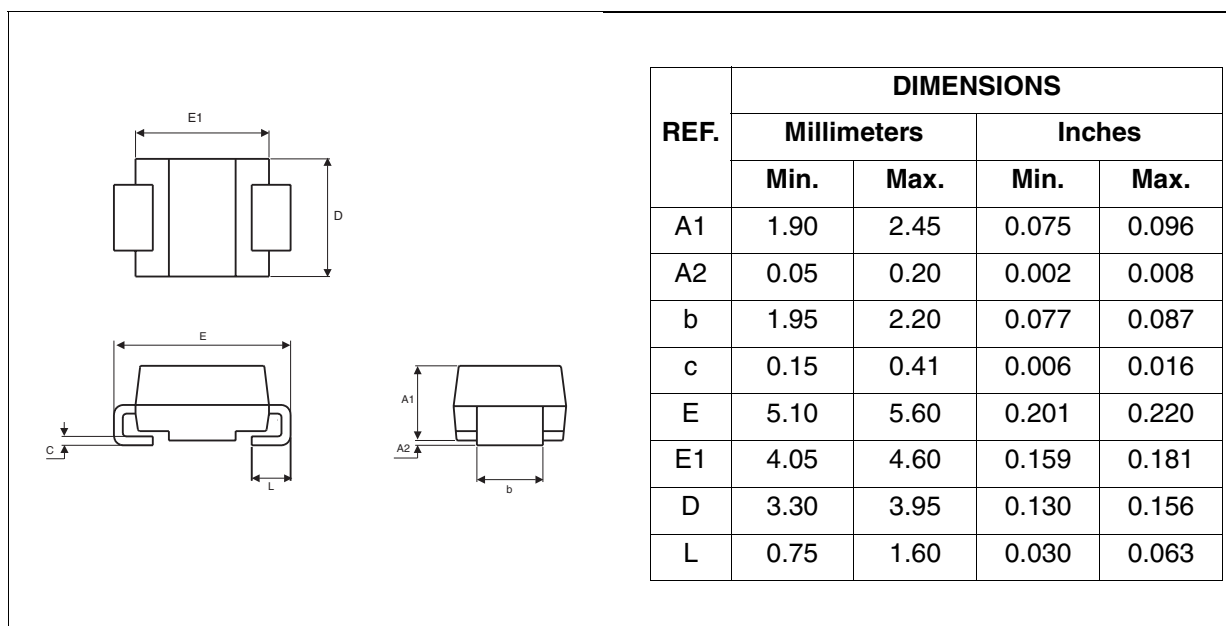
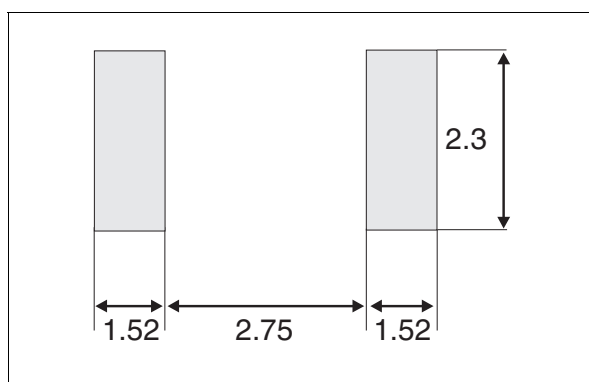
**Figure 18: SMB Package Mechanical Data****Figure 19: SMB Foot Print Dimensions**  
(in millimeters)

Figure 20: DO-41 Package Mechanical Data

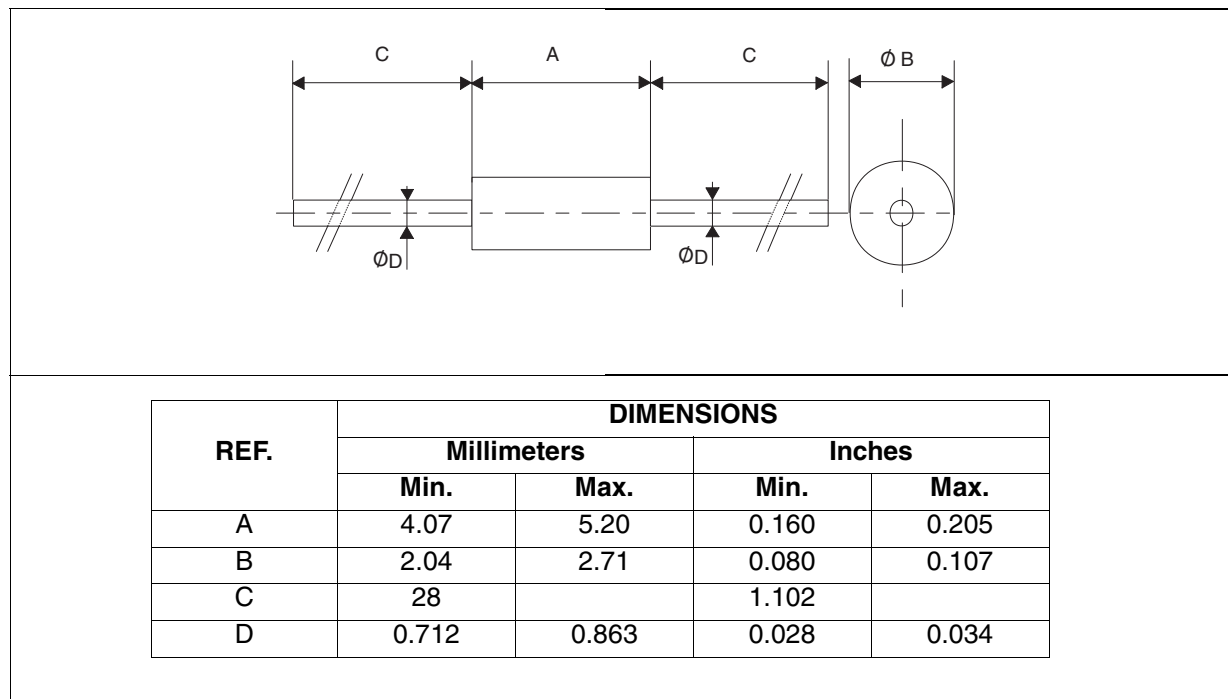


Table 7: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH1R06	STTH1R06	DO-41	0.34 g	2000	Ammopack
STTH1R06RL	STTH1R06	DO-41	0.34 g	5000	Tape & reel
STTH1R06A	AR6	SMA	0.068 g	5000	Tape & reel
STTH1R06B	BR6	SMB	0.11 g	2500	Tape & reel

- Epoxy meets UL94, V0

Table 8: Revision History

Date	Revision	Description of Changes
Apr-2003	1	First issue
07-Sep-2004	2	DO-41 and SMA packages added
24-Feb-2005	3	SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106inc.) to 2.03mm (0.080).

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