

**TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER**
**Table 1: Main Product Characteristics**

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

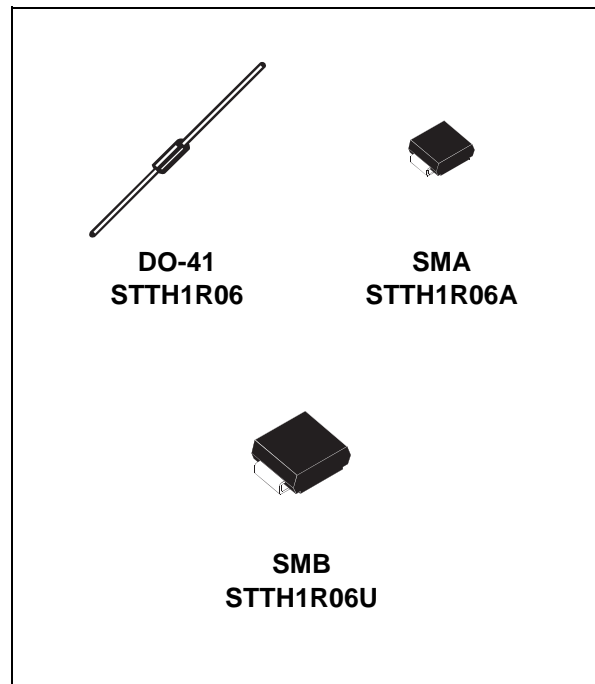
**FEATURES AND BENEFITS**

- 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	
$V_{RRM}$	Repetitive peak reverse voltage		600	V	
$I_{F(RMS)}$	RMS forward current	DO-41	10	A	
		SMA / SMB	7		
$I_{F(AV)}$	Average forward current	DO-41	1	A	
		SMA			$T_c = 100^\circ\text{C} \quad \delta = 0.5$
		SMB			$T_c = 125^\circ\text{C} \quad \delta = 0.5$
$I_{FSM}$	Surge non repetitive forward current	DO-41	25	A	
		SMA / SMB			$t_p = 10\text{ms sinusoidal}$
$T_{stg}$	Storage temperature range		-65 to + 175	°C	
$T_j$	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 (1)	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	$T_j = 25^\circ C$	$I_F = 0.5A$ $I_{rr} = 0.25A$ $I_R = 1A$			25	ns
			$I_F = 1A$ $di_F/dt = -50 A/\mu s$ $V_R = 30V$		30	45	
$t_{fr}$	Forward recovery time	$T_j = 25^\circ C$	$I_F = 1A$ $di_F/dt = 100 A/\mu s$ $V_{FR} = 1.1 \times V_{Fmax}$			100	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25^\circ C$	$I_F = 1A$ $di_F/dt = 100 A/\mu s$ $V_{FR} = 1.1 \times V_{Fmax}$			10	V

Figure 1: Conduction losses versus average forward current

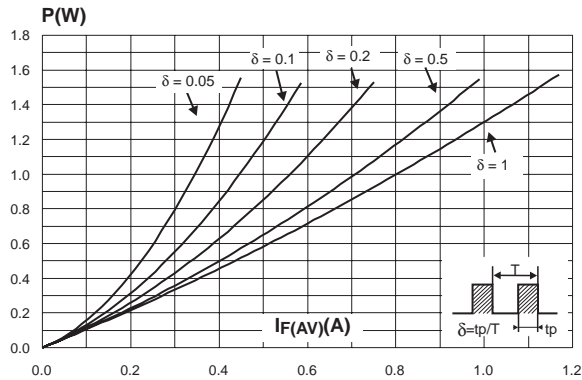


Figure 2: Forward voltage drop versus forward current

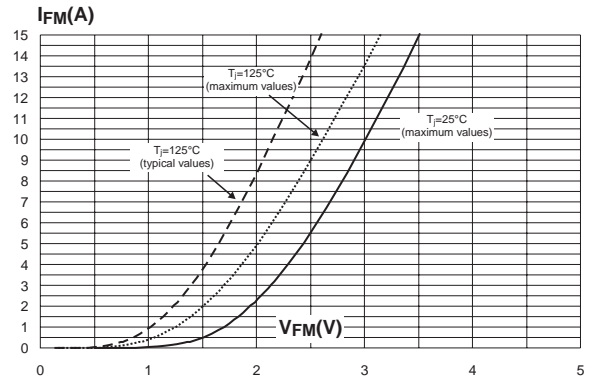


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (DO-41)

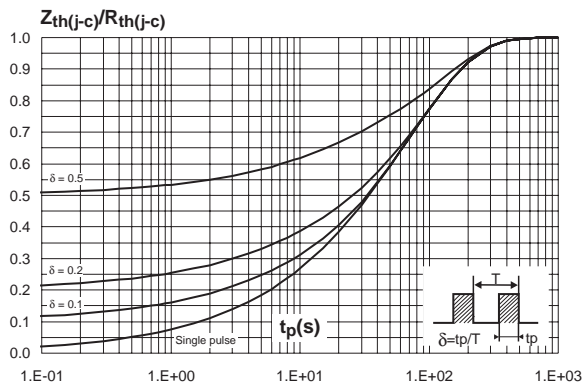


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (SMA)

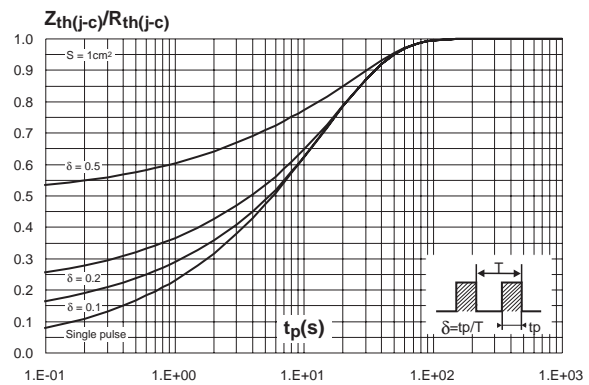


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (SMB)

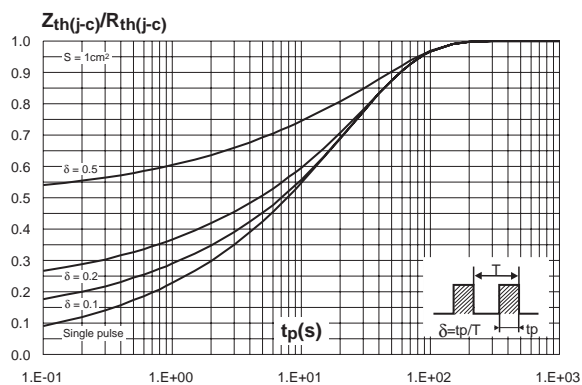


Figure 6: Peak reverse recovery current versus di\_F/dt (typical values)

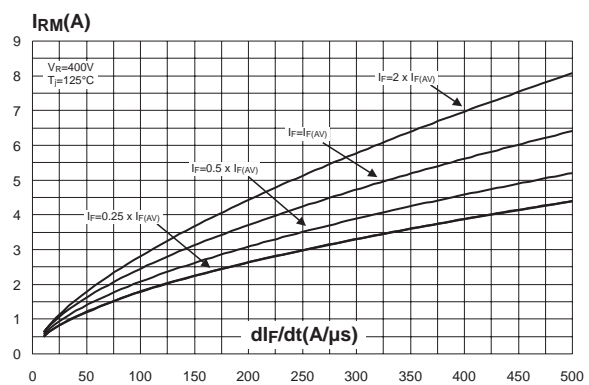


Figure 7: Reverse recovery time versus  $di_F/dt$  (typical values)

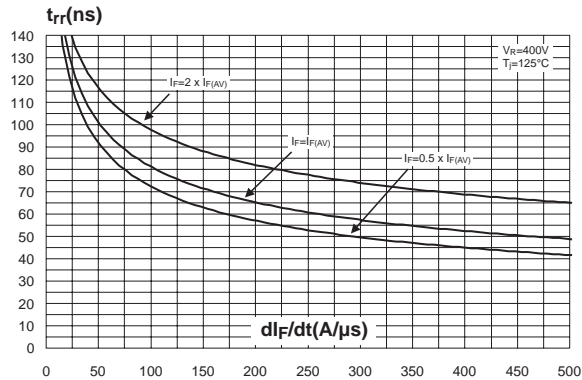


Figure 8: Reverse recovery charges versus  $di_F/dt$  (typical values)

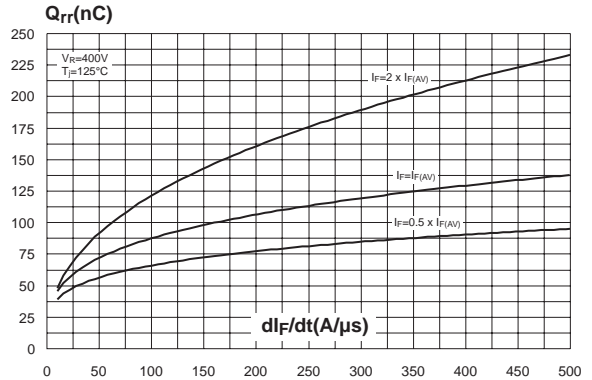


Figure 9: Reverse recovery softness factor versus  $di_F/dt$  (typical values)

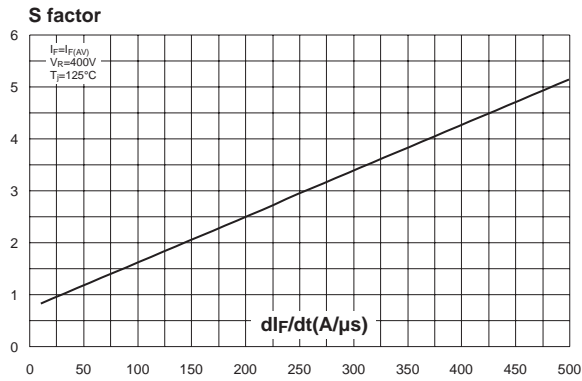


Figure 10: Relative variations of dynamic parameters versus junction temperature

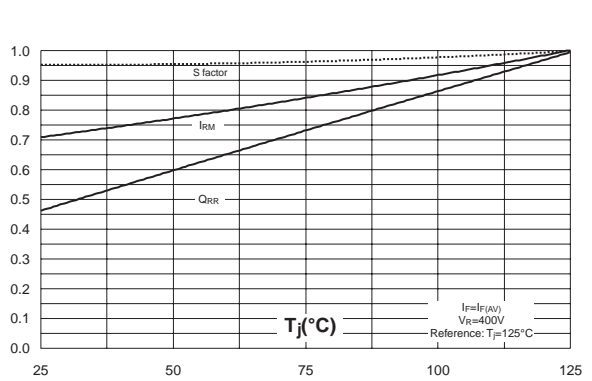


Figure 11: Transient peak forward voltage versus  $di_F/dt$  (typical values)

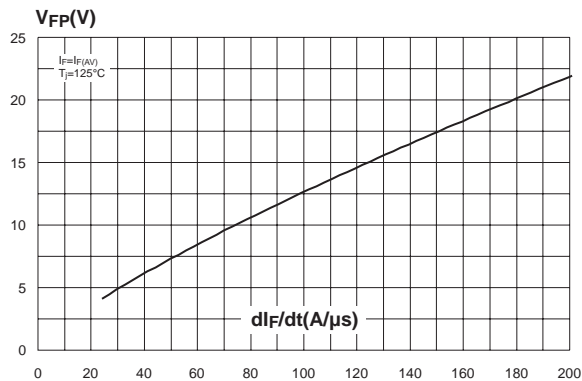
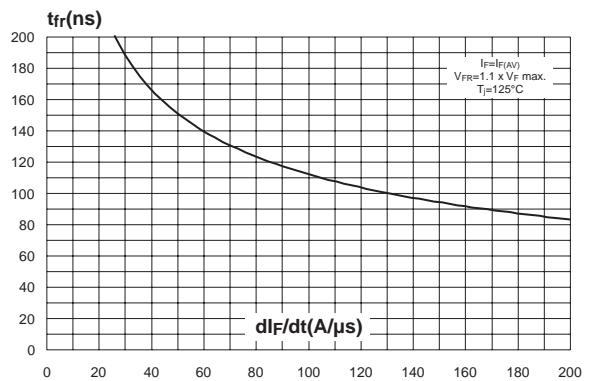
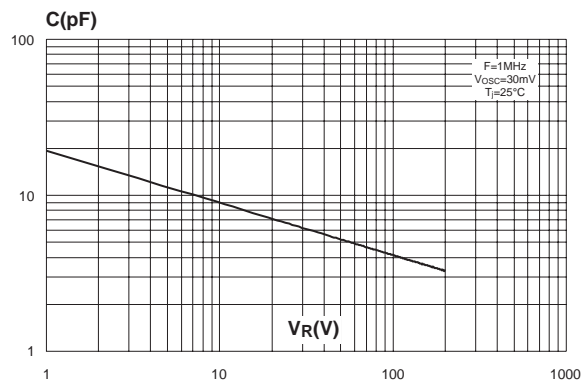


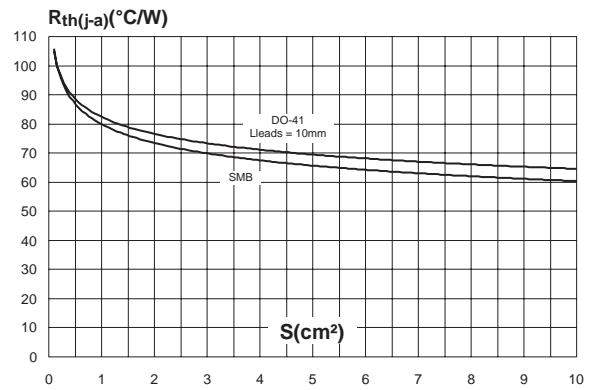
Figure 12: Forward recovery time versus  $di_F/dt$  (typical values)



**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)**

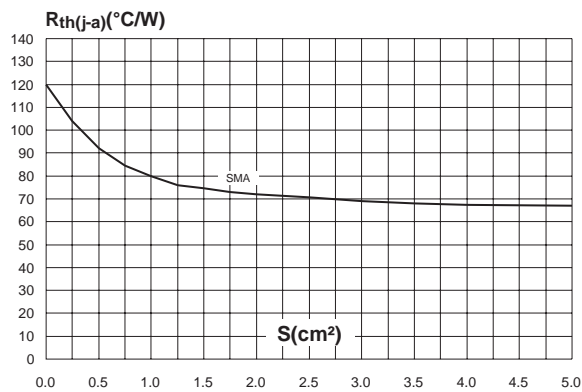


Figure 16: SMA Package Mechanical Data

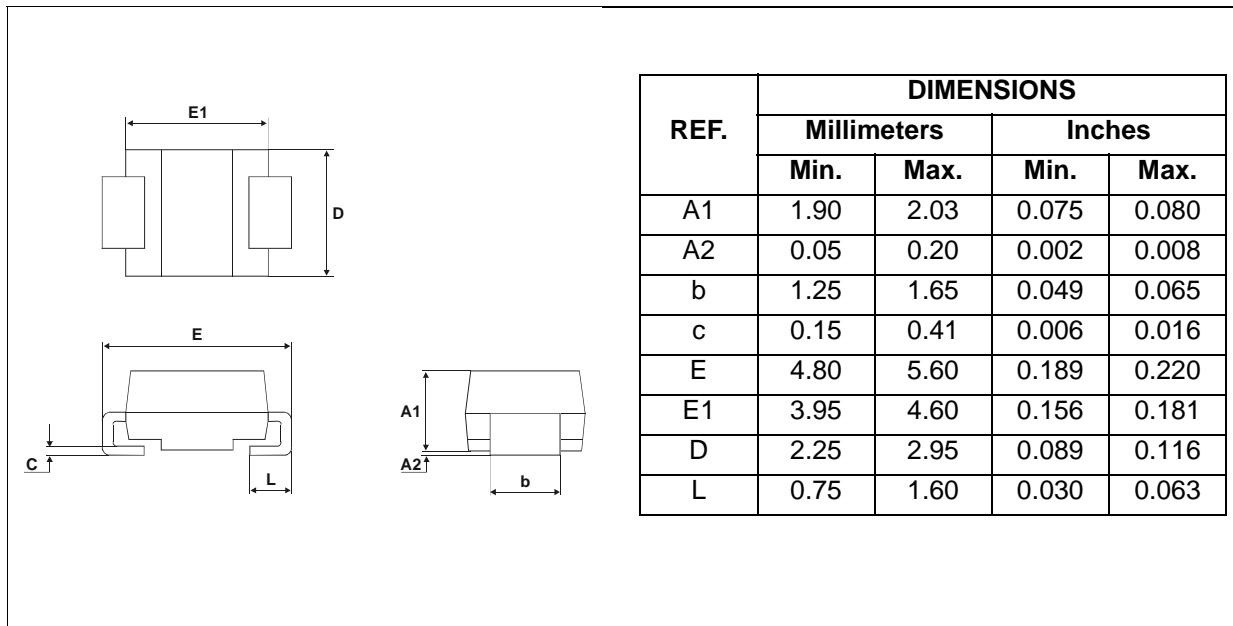


Figure 17: SMA Foot Print Dimensions  
(in millimeters)

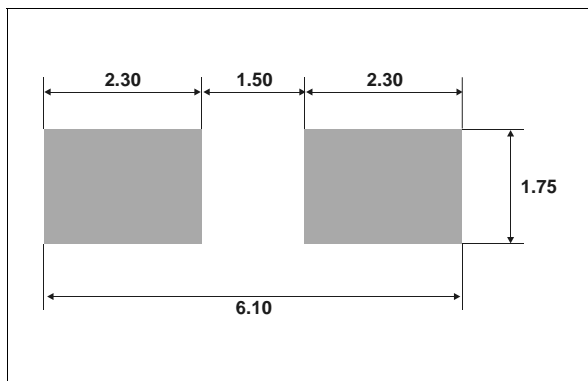


Figure 18: SMB Package Mechanical Data

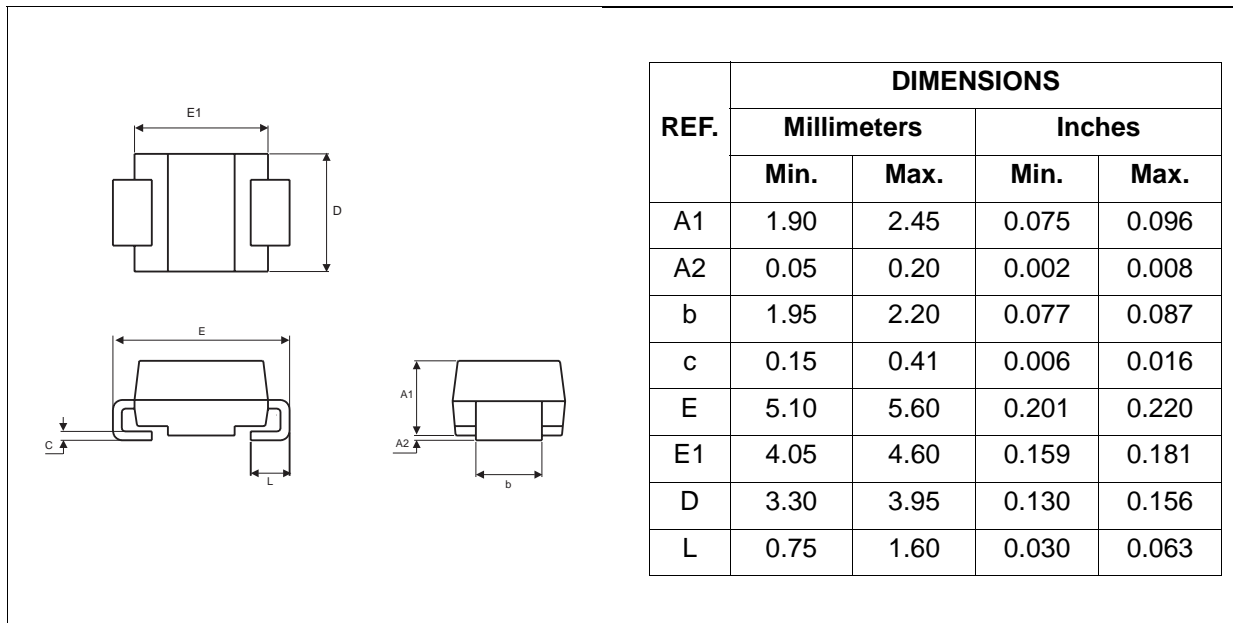
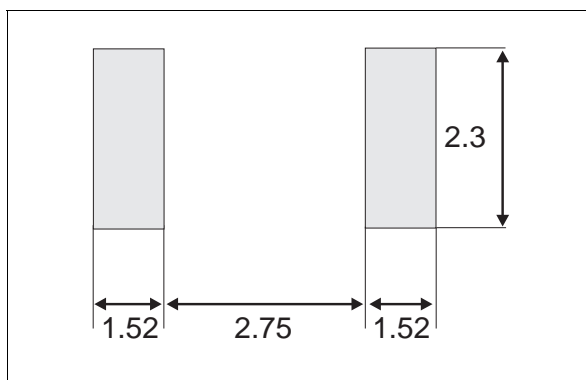
Figure 19: SMB Foot Print Dimensions  
(in millimeters)

Figure 20: DO-41 Package Mechanical Data

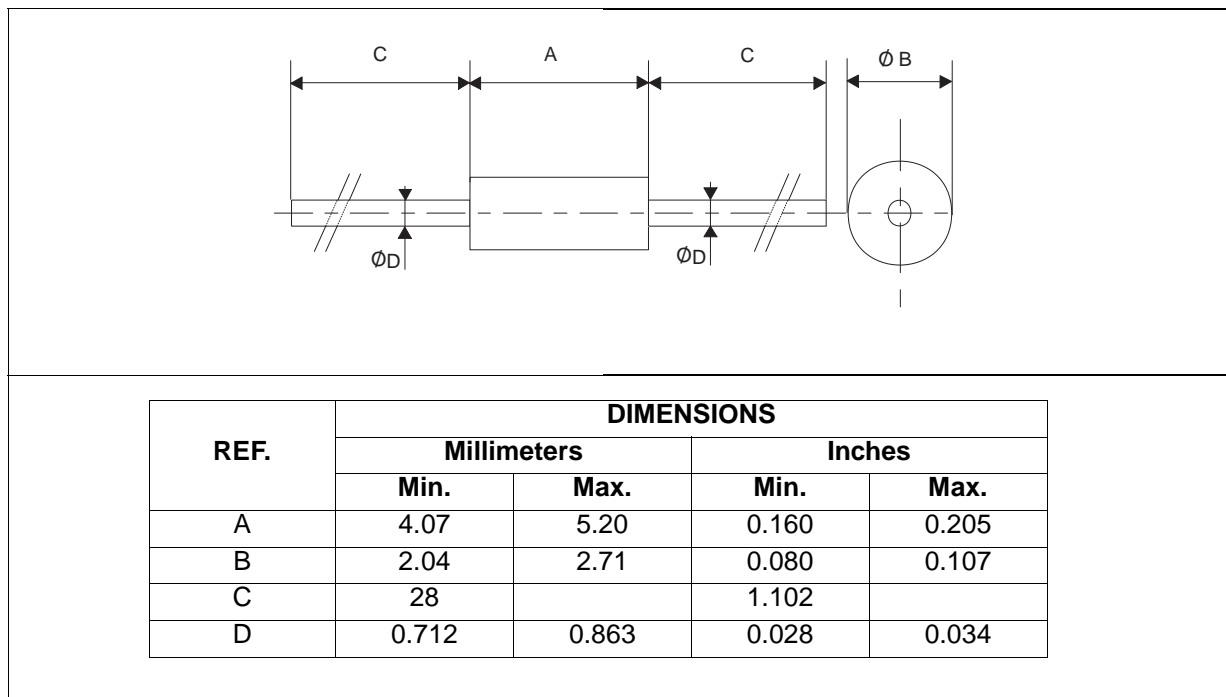


Table 7: Ordering Information

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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