

HIGH EFFICIENCY RECTIFIER

Table 1: Main Product Characteristics

$I_{F(AV)}$	10 A
V_{RRM}	300 V
$t_{rr}(typ)$	13 ns
T_j	175°C
$V_F(typ)$	0.9 V

FEATURES AND BENEFITS

- Ultrafast recovery
- Low power losses
- High surge capability
- Low leakage current
- High junction temperature

DESCRIPTION

The **STTH1003S** is an Ultrafast Recovery Power Rectifier dedicated to **energy recovery in PDP application**.

It is especially designed for clamping function in energy recovery block.

The compromise between forward voltage drop and recovery time offer optimized performances.

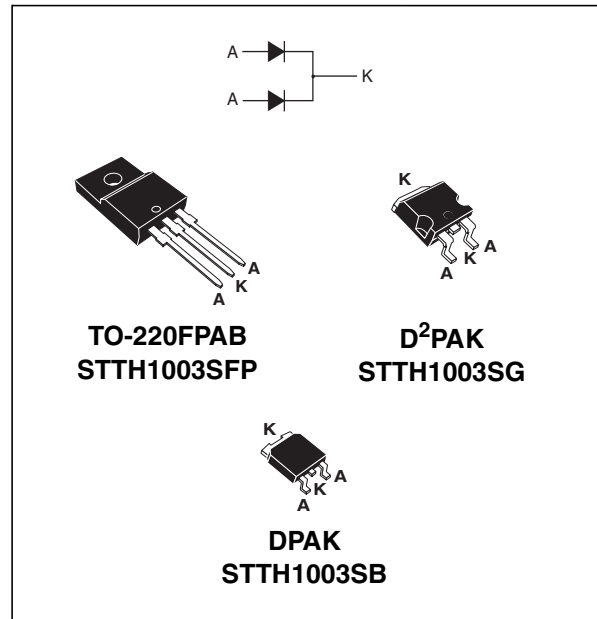


Table 2: Order Codes

Part Numbers	Marking
STTH1003SFP	STTH1003SFP
STTH1003SB	STTH1003SB
STTH1003SB-TR	STTH1003SB
STTH1003SG	STTH1003SG
STTH1003SG-TR	STTH1003SG

Table 3: Absolute Ratings (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		300	V
$I_{F(RMS)}$	RMS forward voltage		20	A
$I_{F(AV)}$	Average forward current	$T_c = 150^\circ\text{C} \quad \delta = 0.5$	10	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ms sinusoidal}$	100	A
I_{RSM}	Non repetitive avalanche current	$t_p = 20 \mu\text{s square}$	4	A
T_{stg}	Storage temperature range		-65 to + 175	°C
T_j	Maximum operating junction temperature		175	°C

Table 4: Thermal Parameters

Symbol	Parameter	Package	Value	Unit
$R_{th(j-c)}$	Junction to case	DBAK	4	$^{\circ}\text{C/W}$
		D ² PAK	4	
		TO220FP	6	

Table 5: Static Electrical Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R^*	Reverse leakage current	$T_j = 25^{\circ}\text{C}$	$V_R = V_{RRM}$			10	μA
		$T_j = 125^{\circ}\text{C}$			10	100	
V_F^{**}	Forward voltage drop	$T_j = 25^{\circ}\text{C}$	$I_F = 10\text{A}$			1.30	V
		$T_j = 125^{\circ}\text{C}$			0.9	1.1	

Pulse test: * $t_p = 5\text{ ms}$, $\delta < 2\%$

** $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation: $P = 0.86 \times I_{F(AV)} + 0.024 I_F^2 (RMS)$

Table 6: Recovery Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25^{\circ}\text{C}$	$I_F = 0.5\text{A}$ $I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$		13	17	ns
			$I_F = 1\text{A}$ $V_R = 30\text{V}$ $di_F/dt = -50\text{ A}/\mu\text{s}$		28	35	
t_{fr}	Forward recovery time	$T_j = 25^{\circ}\text{C}$	$I_F = 10\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
I_{RM}	Reverse recovery current	$T_j = 125^{\circ}\text{C}$	$I_F = 10\text{A}$ $V_{CC} = 200\text{V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$		5.7	7.5	A
S_{factor}	Softness factor				0.3		
V_{FP}	Peak forward voltage	$T_j = 25^{\circ}\text{C}$	$I_F = 10\text{A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$		2.5	3.5	V

Figure 1: Forward voltage drop versus current (maximum values)

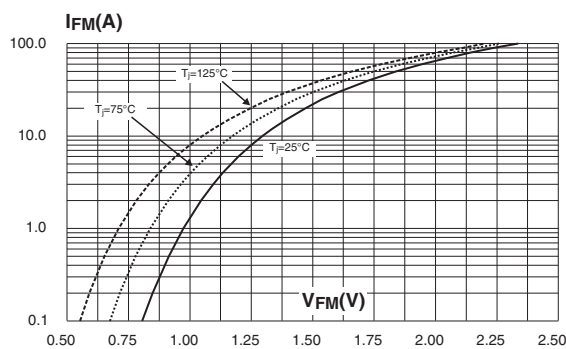
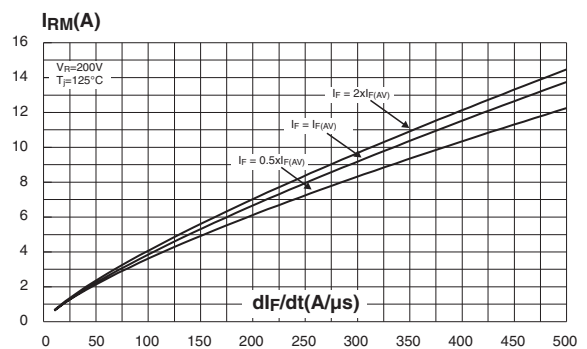
Figure 2: Peak reverse recovery current versus di_F/dt (90% confidence)

Figure 3: Reverse recovery time versus di_F/dt (90% confidence)

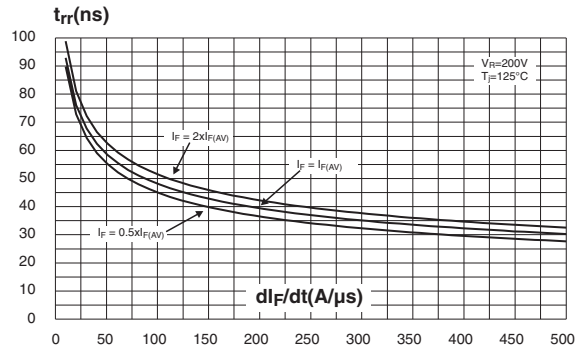


Figure 4: Softness factor versus di_F/dt (typical values)

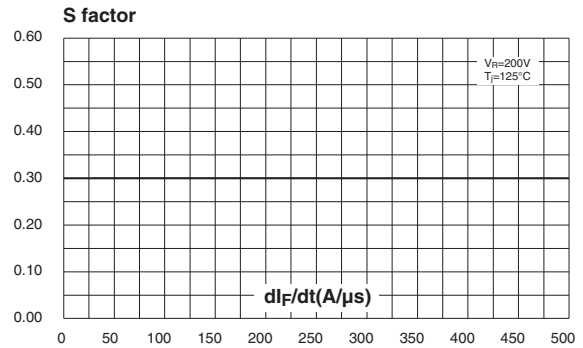


Figure 5: Relative variations of dynamic parameters versus junction temperature (reference: $T_J = 125^\circ\text{C}$)

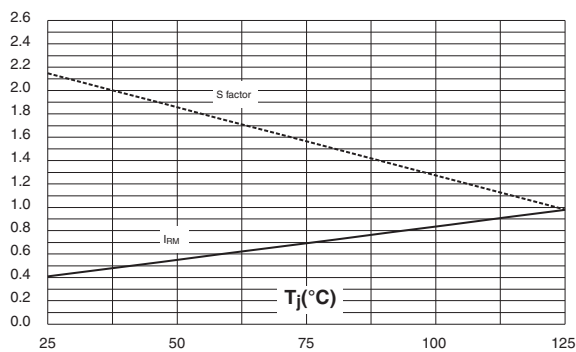


Figure 6: Transient peak forward voltage versus di_F/dt (90% confidence)

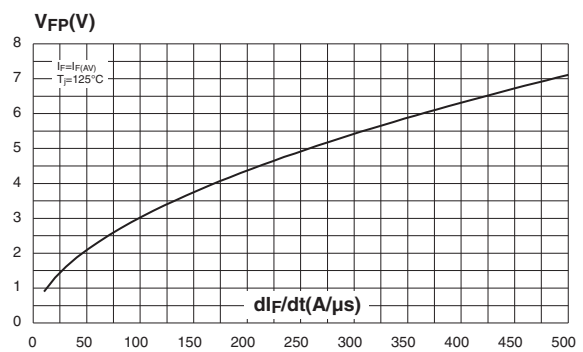


Figure 7: Forward recovery time versus di_F/dt (90% confidence)

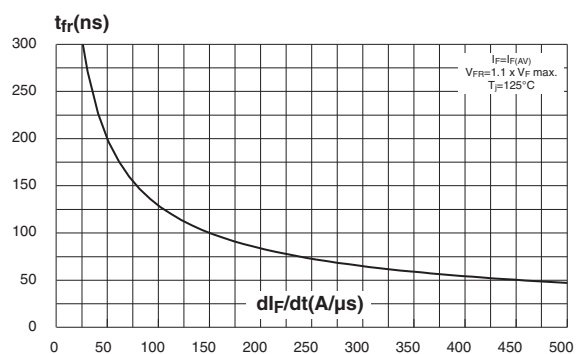


Figure 8: DPAK Package Mechanical Data

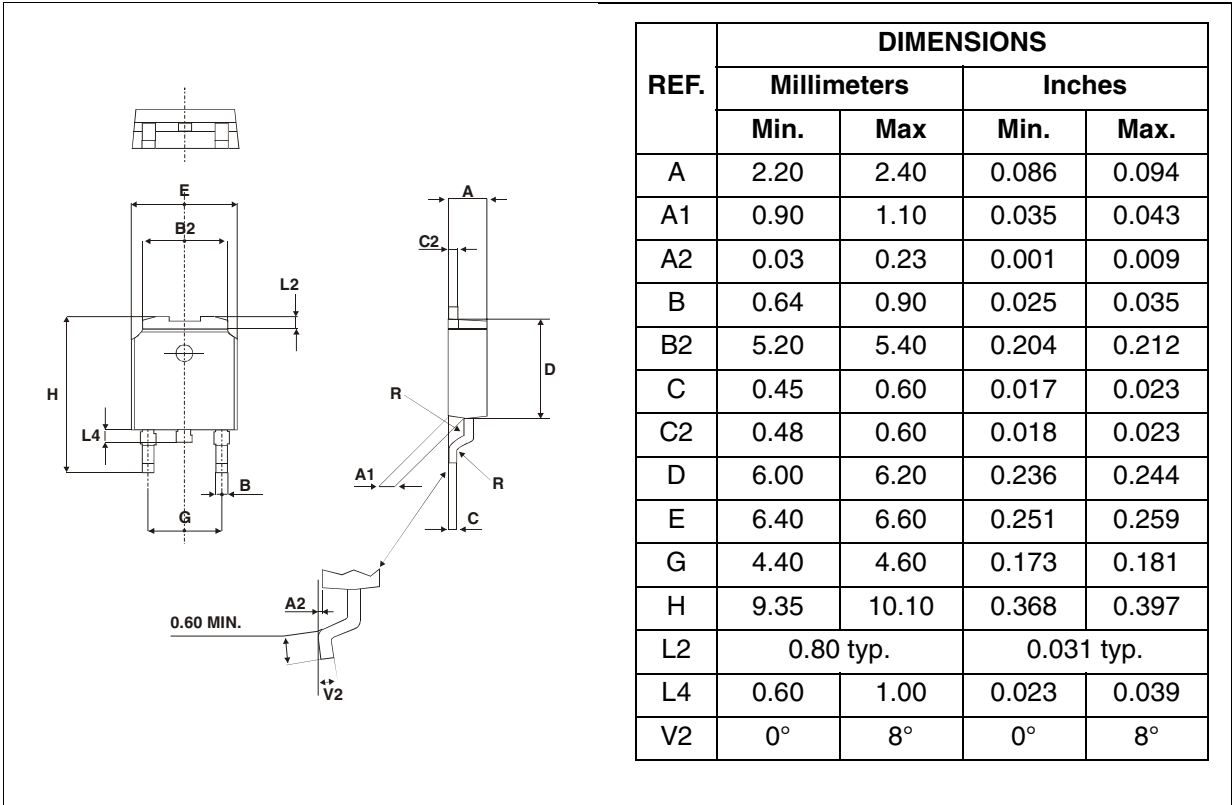


Figure 9: Foot Print dimensions (in millimeters)

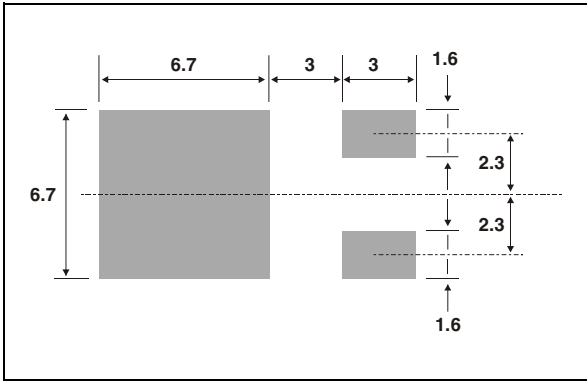


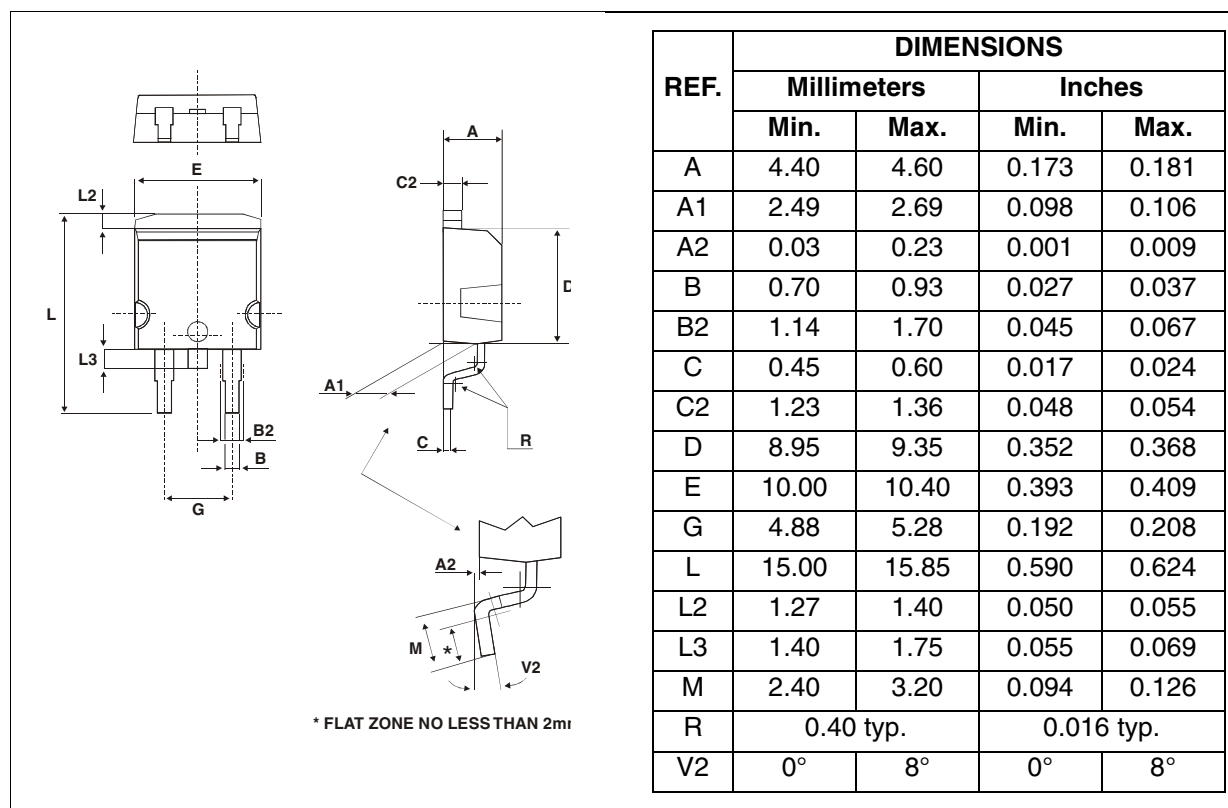
Figure 10: D²PAK Package Mechanical Data

Figure 11: Foot Print dimensions (in millimeters)

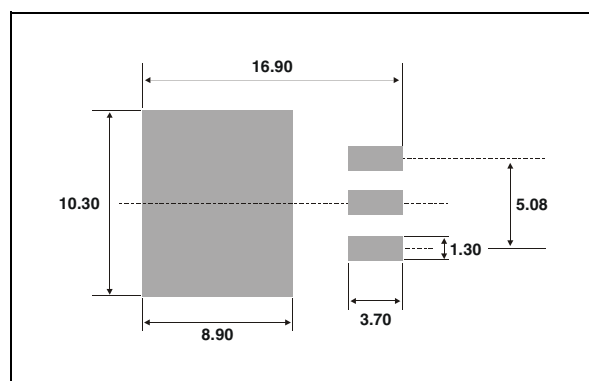
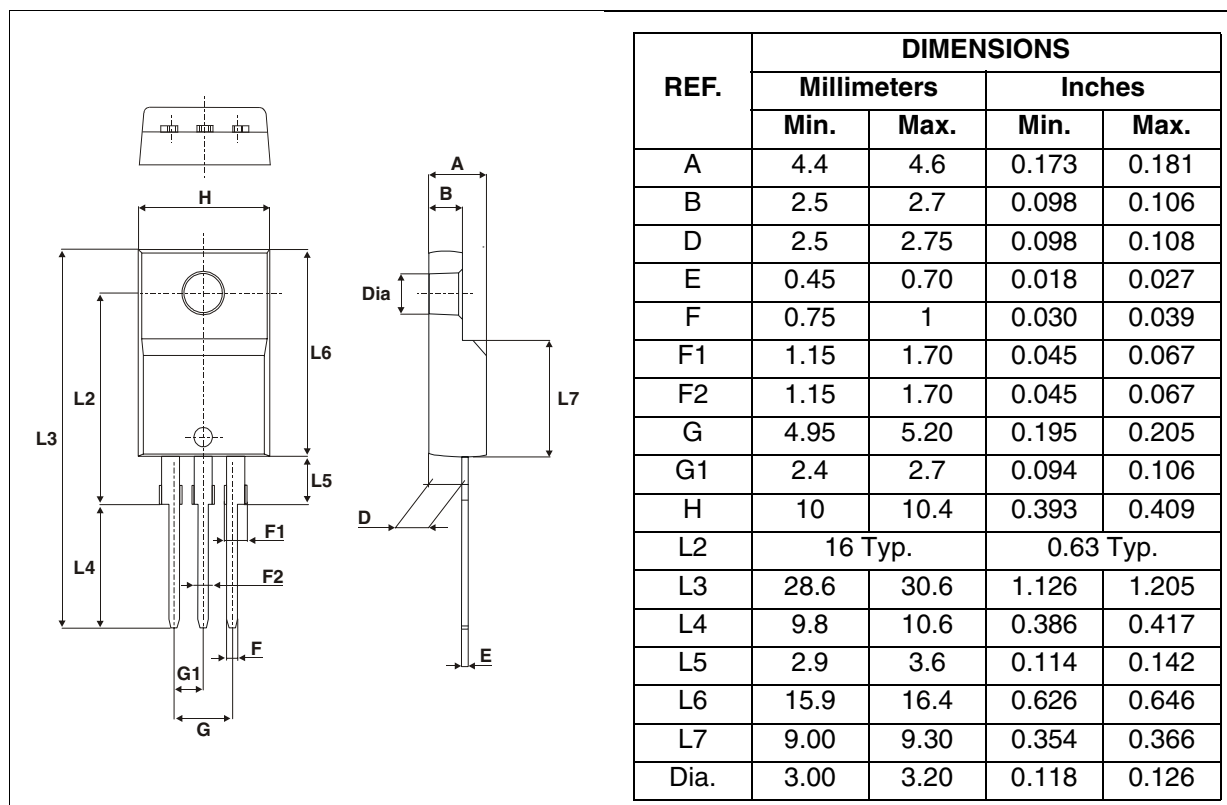


Figure 12: TO-220FPAB Package Mechanical Data



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
STTH1003SFP	STTH1003SFP	TO-220FPAB	1.70 g	50	Tube
STTH1003SB	STTH1003SB	DPAK	0.3 g	75	Tube
STTH1003SB-TR	STTH1003SB			2500	Tape & reel
STTH1003SG	STTH1003SG	D ² PAK	1.48 g	50	Tube
STTH1003SG-TR	STTH1003SG			1000	Tape & reel

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N.
- Maximum torque value: 1.0 m.N.

Table 8: Revision History

Date	Revision	Description of Changes
24-Aug-2005	1	First issue.

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