STTH1003S

HIGH EFFICIENCY RECTIFIER

Table 1: Main Product Characteristics

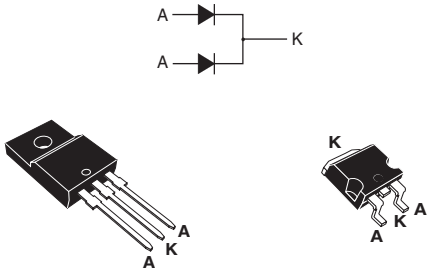
$I_{F(AV)}$	10 A
V_{RRM}	300 V
t_{rr} (typ)	13 ns
T_j	175°C
V_F (typ)	0.9 V

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.



TO-220FPAB
STTH1003SFP

D²PAK
STTH1003SG

DPAK
STTH1003SB

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°C δ = 0.5	10	A
I_{FSM}	Surge non repetitive forward current	t_p = 10ms sinusoidal	100	A
I_{RSM}	Non repetitive avalanche current	t_p = 20 µs 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	DPAK	4	°C/W
		D^2PAK	4	
		TO220FP	6	

Table 5: Static Electrical Characteristics

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

Pulse test: * tp = 5 ms, δ < 2%
** tp = 380 µs, δ < 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°C	I_F = 0.5A I_{rr} = 0.25A I_R = 1A		13	17	ns
			I_F = 1A V_R = 30V dI_F/dt = -50 A/µs		28	35	
t_{fr}	Forward recovery time	T_j = 25°C	I_F = 10A dI_F/dt = 100 A/µs $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
I_{RM}	Reverse recovery current	T_j = 125°C	I_F = 10A V_{CC} = 200V dI_F/dt = 200 A/µs		5.7	7.5	A
S_{factor}	Softness factor				0.3		
V_{FP}	Peak forward voltage	T_j = 25°C	I_F = 10A dI_F/dt = 100 A/µs		2.5	3.5	V

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

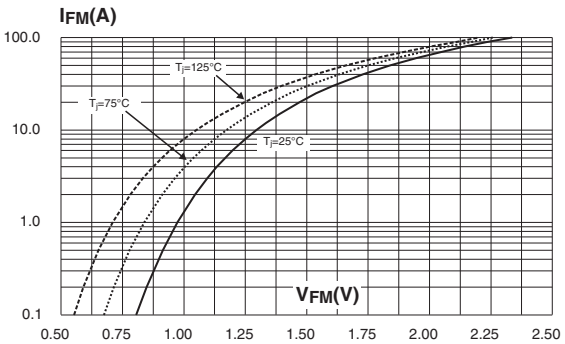


Figure 2: Peak reverse recovery current versus dI_F/dt (90% confidence)

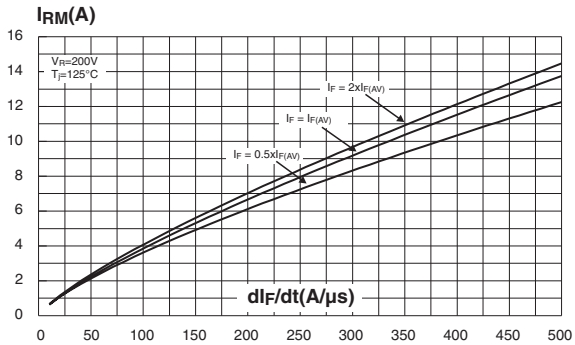


Figure 3: Reverse recovery time versus dI_F/dt (90% confidence)

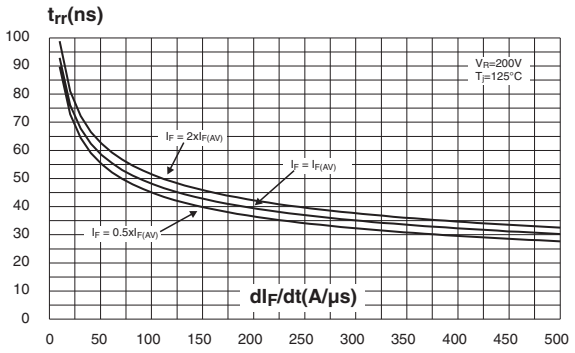


Figure 4: Softness factor versus dI_F/dt (typical values)

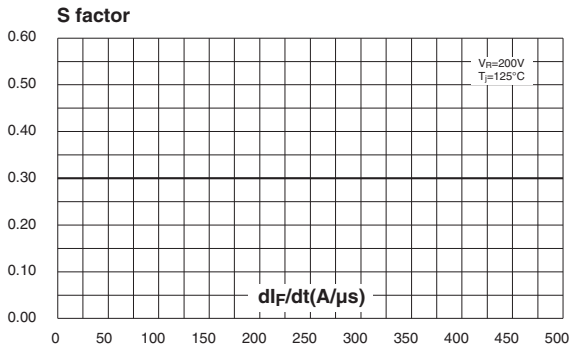


Figure 5: Relative variations of dynamic parameters versus junction temperature (reference: Tj = 125°C)

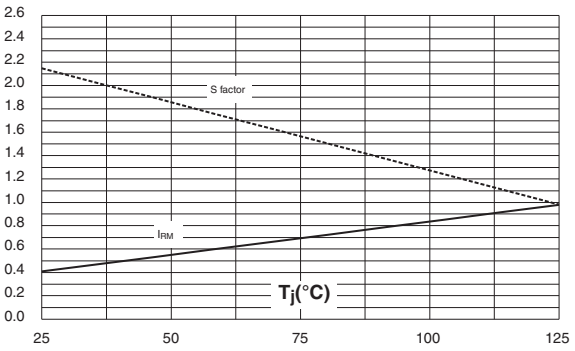


Figure 6: Transient peak forward voltage versus dI_F/dt (90% confidence)

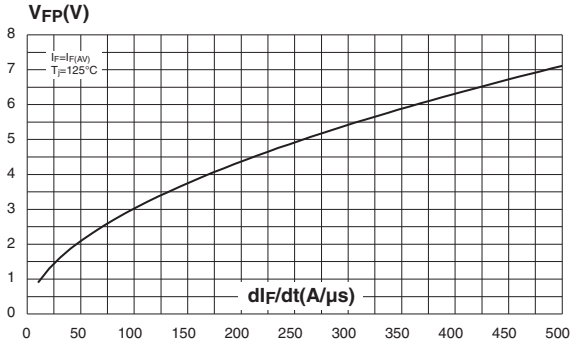


Figure 7: Forward recovery time versus dI_F/dt (90% confidence)

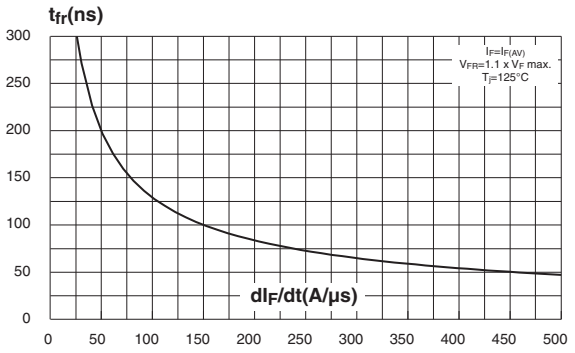
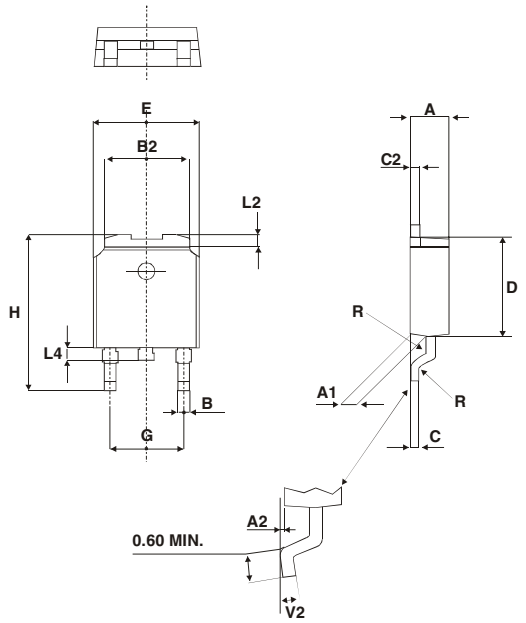


Figure 8: DPAK Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 9: Foot Print dimensions (in millimeters)

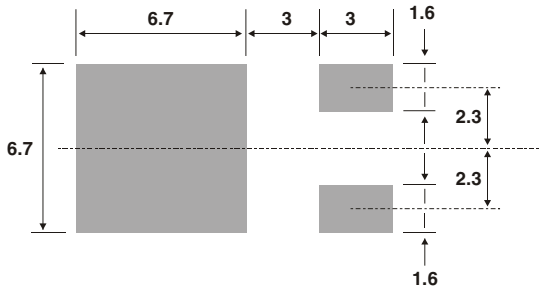
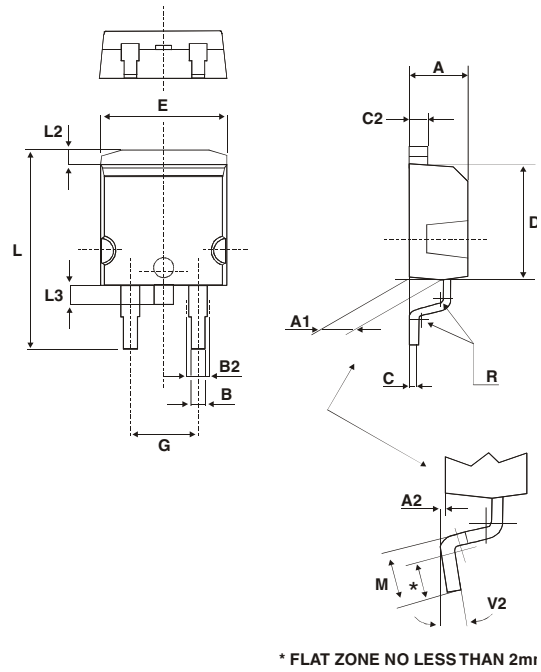


Figure 10: D²PAK Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 11: Foot Print dimensions (in millimeters)

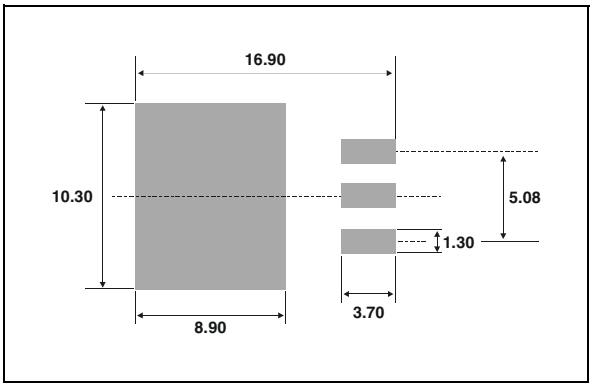
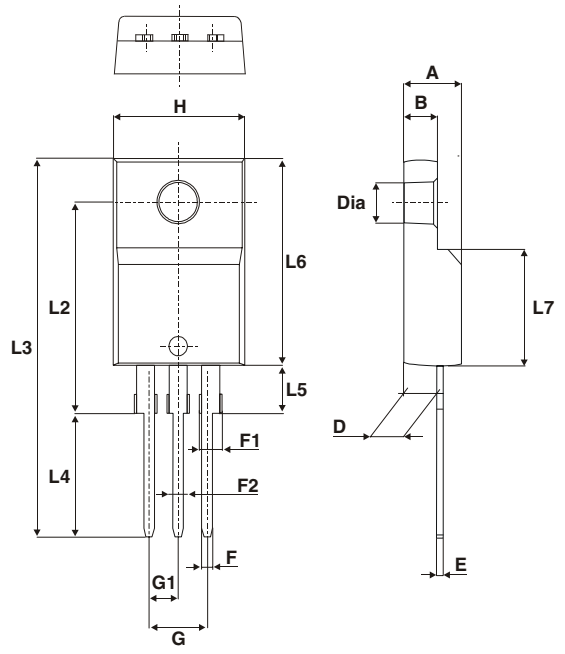


Figure 12: TO-220FPAB Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

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^2PAK	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.