STTH1003S

Hight efficiency rectifier

Features

- 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 applications.

It is especially designed for clamping function in energy recovery block. The compromise between forward voltage drop and recovery time offers optimized performances.

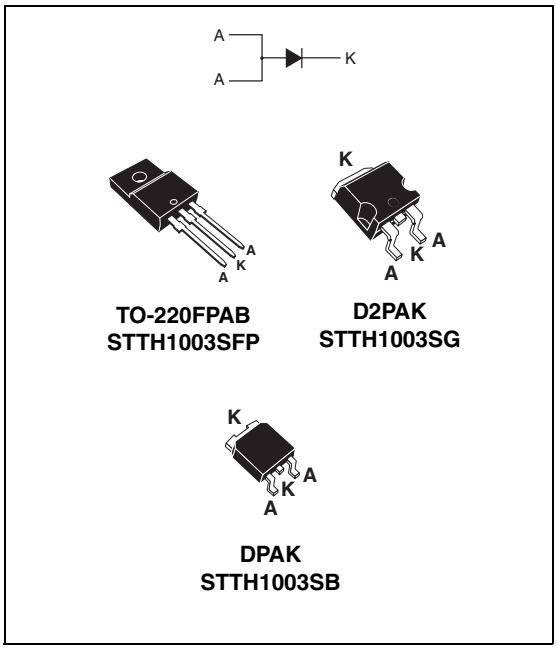


Table 1. Device summary

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

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		300	V
$I_{F(RMS)}$	Forward rms current		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 = 10 ms 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 3. Thermal resistance

Symbol	Parameter	Package	Value	Unit
$R_{th(j-c)}$	Junction to case	DPAK, D^2PAK	4	°C/W
		TO-220FPAB	6	

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	-	10	µA
		T_j = 125 °C		-	10	100	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	-	1.30	V
		T_j = 125 °C		-	0.9	1.1	

1. Pulse test: t_p = 5 ms, δ < 2 %
2. Pulse test: t_p = 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 5. Recovery characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A	-	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 = 10 A, dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}	-	-	200	ns
V_{FP}	Peak forward voltage	T_j = 25 °C	I_F = 10 A, dI_F/dt = 100 A/µs	-	2.5	3.5	V
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 10 A, V_{CC} = 200 V dI_F/dt = 200 A/µs	-	5.7	7.5	A
S_{factor}	Softness factor			-	0.3	-	

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

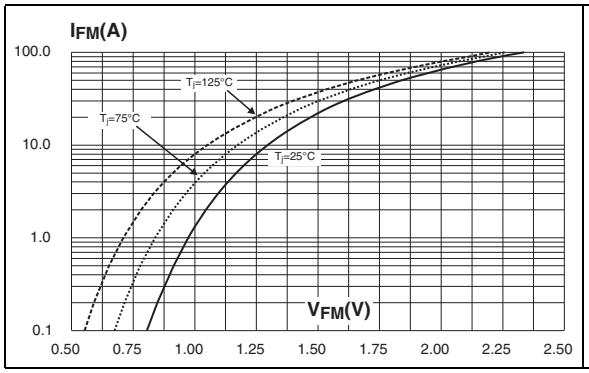


Figure 2. Peak reverse recovery current versus dI_F/dt (90% confidence)

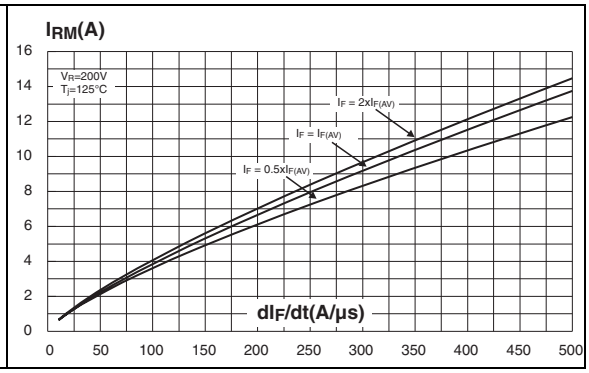


Figure 3. Reverse recovery time versus dI_F/dt (90% confidence)

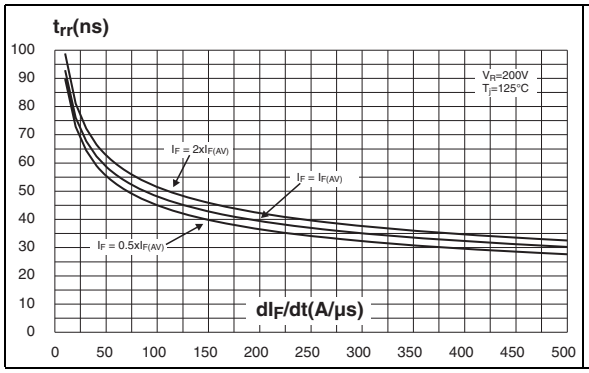


Figure 4. Softness factor versus dI_F/dt (typical values)

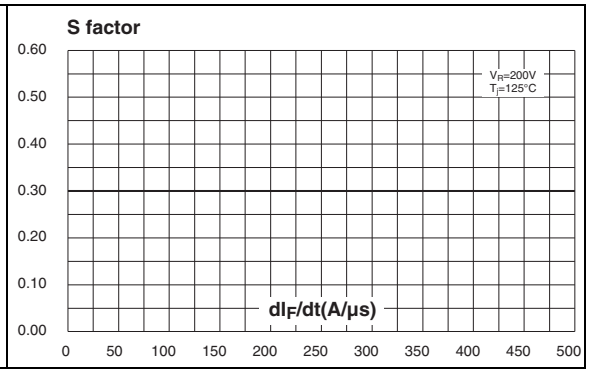


Figure 5. Relative variations of dynamic parameters versus junction temperature (reference: Tj = 125 °C)

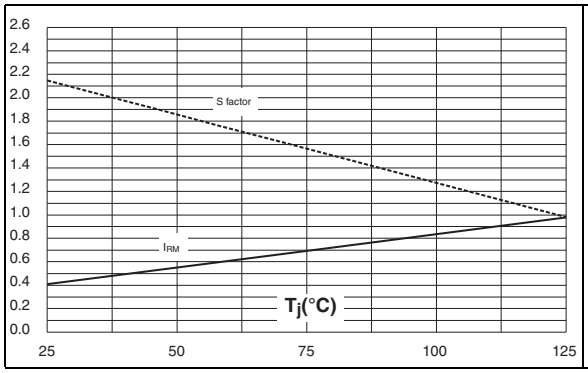


Figure 6. Transient peak forward voltage versus dI_F/dt (90% confidence)

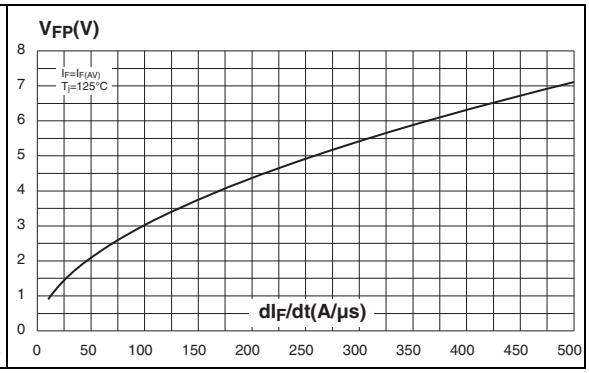
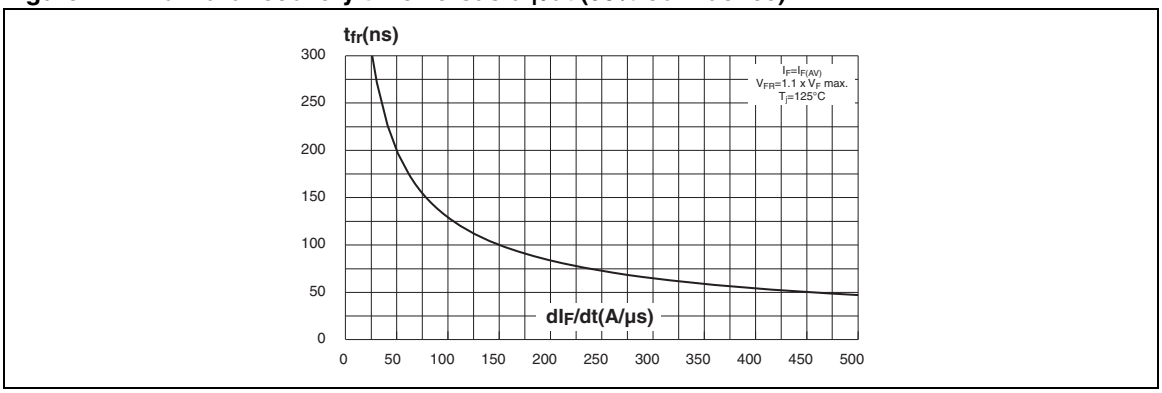


Figure 7. Forward recovery time versus dI_F/dt (90% confidence)

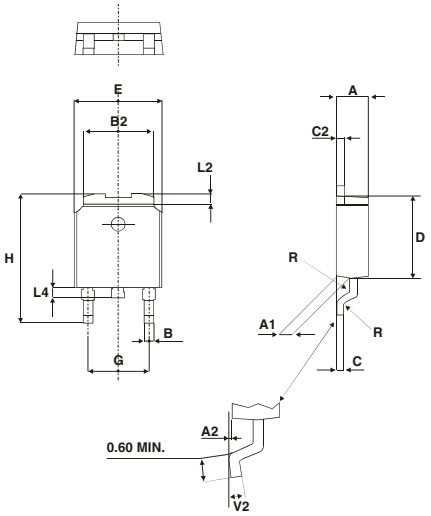


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction
- Recommended torque value: 0.4 to 0.6 N·m.

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. DPAK dimensions



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 8. Footprint (dimensions in mm)

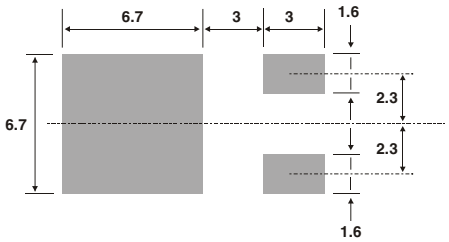
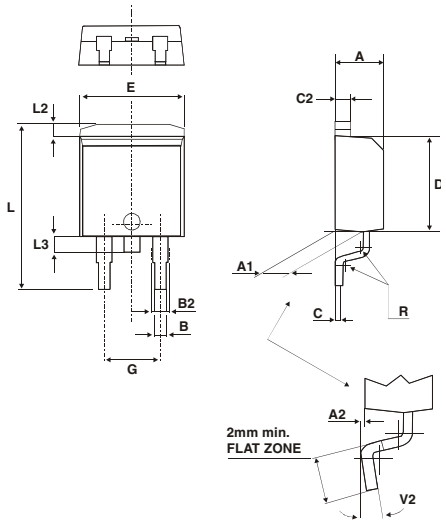


Table 7. D²PAK dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		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	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
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
R	0.40			0.016		
V2	0°		8°	0°		8°

Figure 9. Footprint (dimensions in mm)

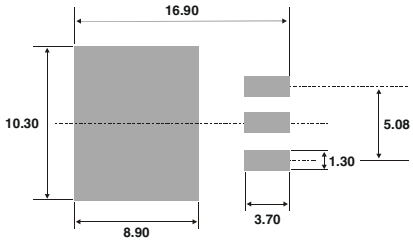
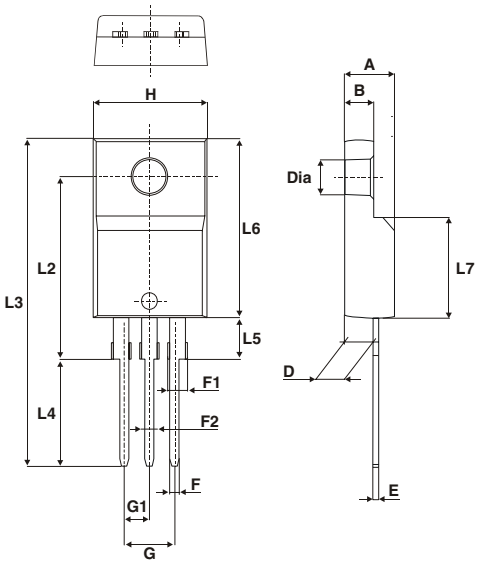


Table 8. TO-220FPAB dimensions



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	1.50	0.045	0.059
F2	1.15	1.50	0.045	0.059
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

3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1003SFP	STTH1003S	TO-220FPAB	1.70 g	50	Tube
STTH1003SB	STTH1003S	DPAK	0.3 g	75	Tube
STTH1003SB-TR	STTH1003S			2500	Tape and reel
STTH1003SG	STTH1003S	D^2PAK	1.48 g	50	Tube
STTH1003SG-TR	STTH1003S			1000	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
24-Aug-2005	1	First issue.
18-May-2009	2	Reformatted to current standards. Modified configuration diagram on front page. Update dimensions F1 and F2 in *Table 8*.

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