

Features

- Ultrafast recovery
- Low power losses
- High surge capability
- Low leakage current
- High junction temperature
- ECOPACK[®]2 compliant component for DPAK on demand

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

Symbol	Value
$I_{F(AV)}$	10 A
V_{RRM}	300 V
$t_{rr}(typ)$	13 ns
$T_j(max)$	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	$T_c = 150\text{ °C} \quad \delta = 0.5$	10	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	100	A
I_{RSM}	Non repetitive avalanche current	$t_p = 20\text{ }\mu\text{s square}$	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	4	°C/W

Table 4. Static electrical characteristics

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

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

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.86 \times I_{F(AV)} + 0.024 I_{F(RMS)}^2$$

Table 5. Recovery characteristics

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

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

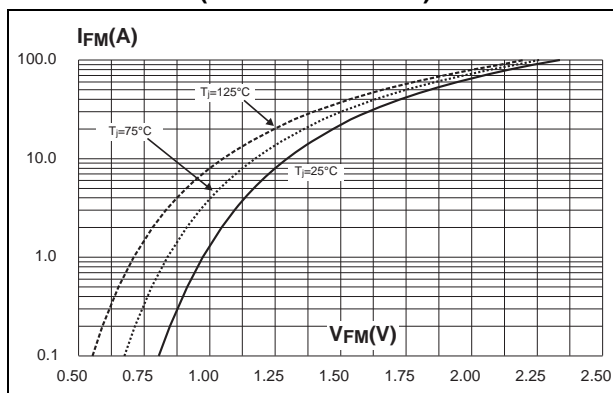


Figure 2. Peak reverse recovery current versus dI_F/dt (90% confidence)

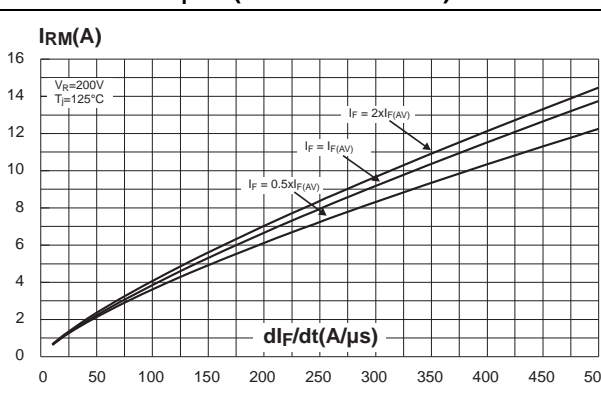


Figure 3. Reverse recovery time versus dI_F/dt (90% confidence)

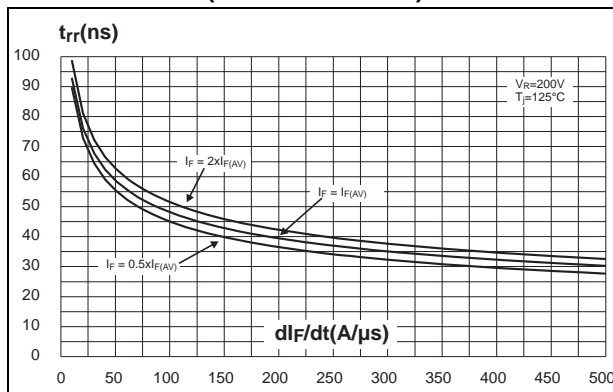


Figure 4. Softness factor versus dI_F/dt (typical values)

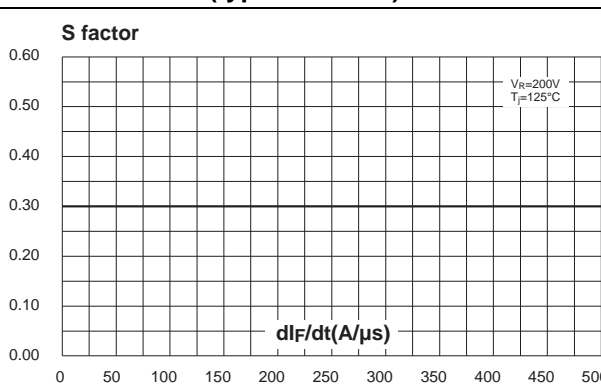


Figure 5. Relative variations of dynamic parameters versus junction temperature (reference: $T_j = 125\text{ }^\circ\text{C}$)

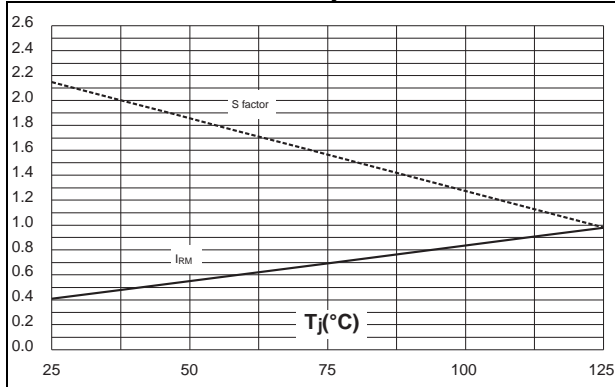


Figure 6. Transient peak forward voltage versus di_F/dt (90% confidence)

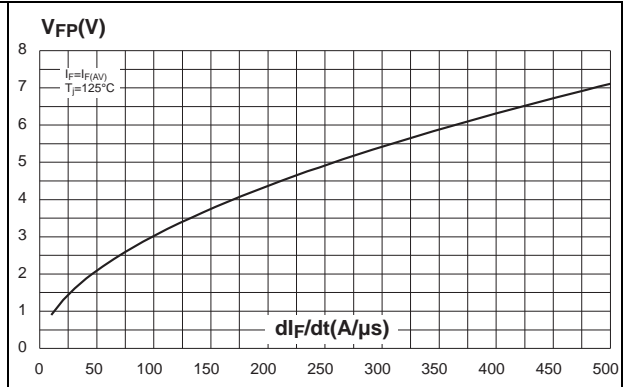
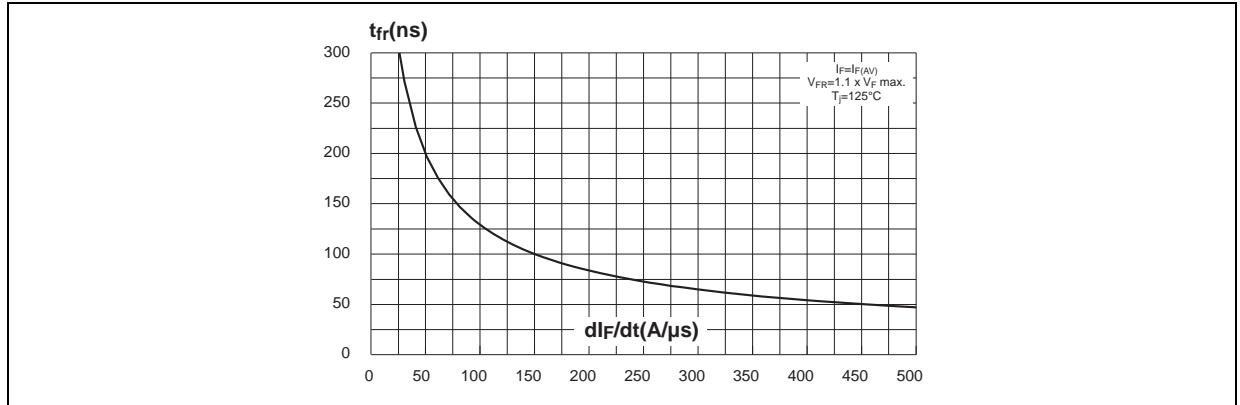


Figure 7. Forward recovery time versus di_F/dt (90% confidence)

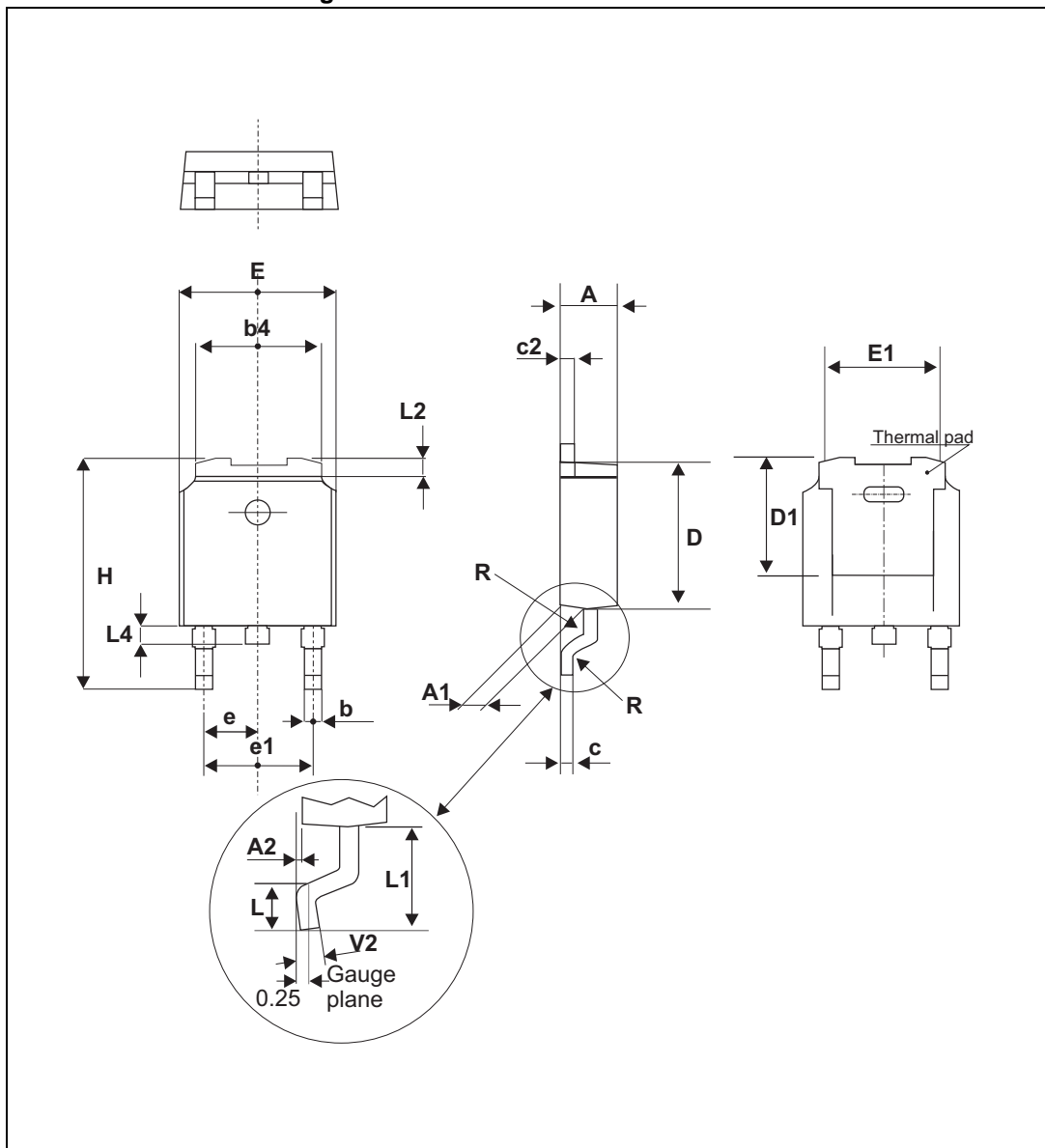


2 Package Information

- Epoxy meets UL94, V0
- Lead-free package

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.

Figure 8. DPAK dimension definitions

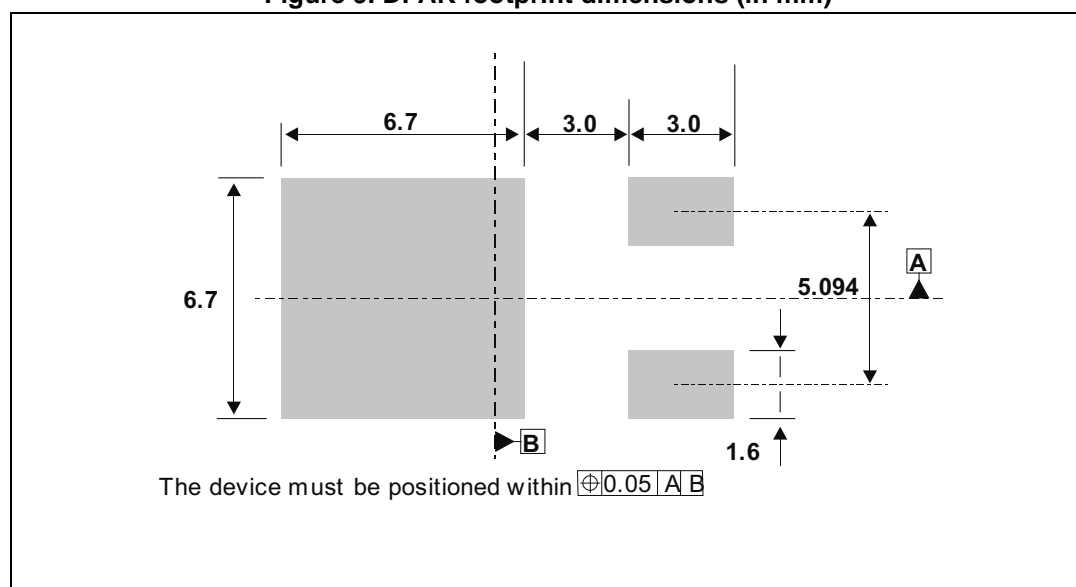


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. DPAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.085		0.094
A1	0.90		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.01
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.195		0.215
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.024
D	5.97		6.22	0.235		0.245
D1	5.10			0.201		
E	6.35		6.73	0.250		0.265
E1	4.32			0.170		
e1	4.4		4.7	0.173		0.185
H	9.35		10.40	0.368		0.407
L	1.0		1.78	0.039		0.070
L2			1.27			0.05
L4	0.6		1.02	0.024		0.040
V2	0°		8°	0°		8°

Figure 9. DPAK footprint dimensions (in mm)



3 Ordering Information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1003SB-TR	STTH1003S	DPAK	0.30 g	2500	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Description of Changes
24-Aug-2005	1	First issue.
18-May-2009	2	Reformatted to current standards. Modified configuration diagram on front page.
01-Apr-2014	3	Updated dimensions F1 and F2 in TO-220FPAB package dimensions.
01-Aug-2014	4	Updated DPAK package information and removed D ² PAK and TO-220FPAB package and characteristics.
17-Sep-2014	5	Updated Figure 8 and Figure 9 .

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