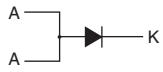
STTH1003S-Y

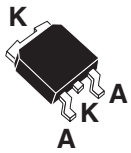
Automotive high efficiency rectifier

Datasheet – production data

Features

- Ultrafast recovery
- Low power losses
- High surge capability
- Low leakage current
- High junction temperature
- AEC-Q101 qualified





DPAK
STTH1003SBY-TR

Description

The STTH1003S-Y is an ultrafast recovery power rectifier dedicated to energy recovery in automotive applications.

The STTH1003S-Y is especially designed for the clamping function in an 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	Operating junction temperature range		-40 to + 175	°C

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	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 °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)

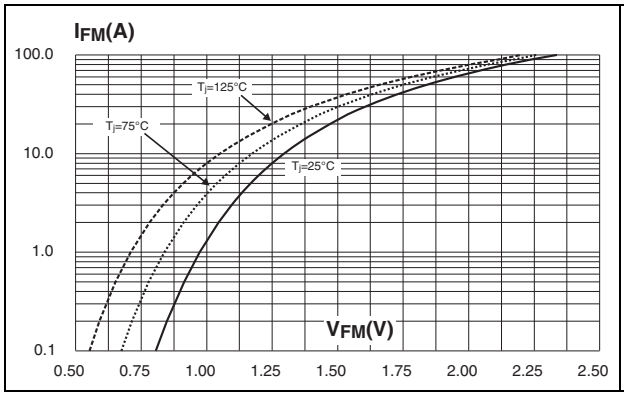


Figure 2. Peak reverse recovery current versus dI_F/dt (90% confidence)

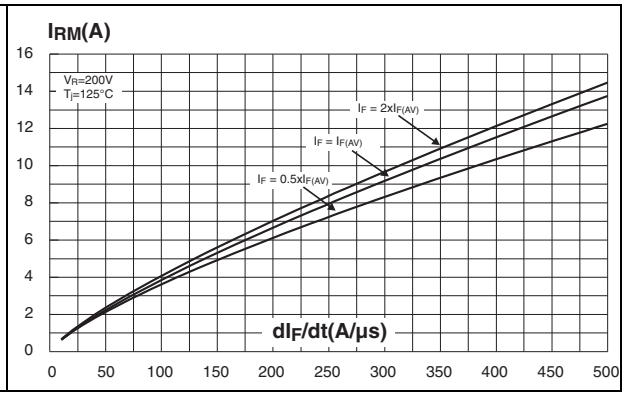


Figure 3. Reverse recovery time versus dI_F/dt (90% confidence)

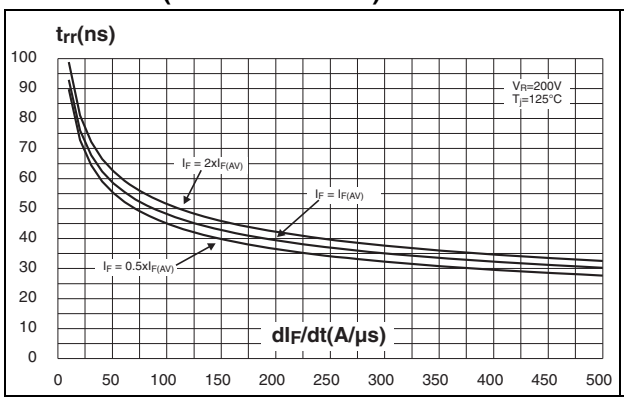


Figure 4. Softness factor versus dI_F/dt (typical values)

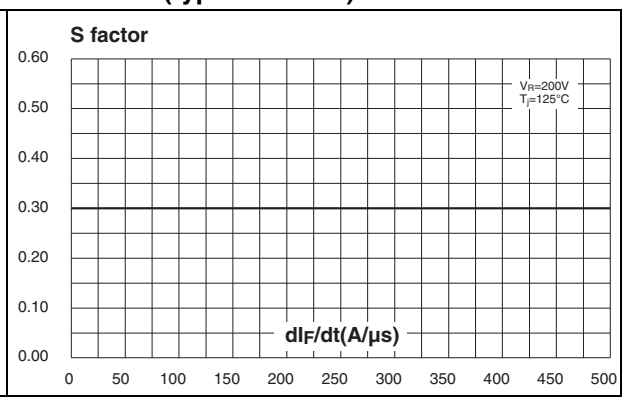


Figure 5. Relative variations of dynamic parameters versus junction temperature (reference: T_j = 125 °C)

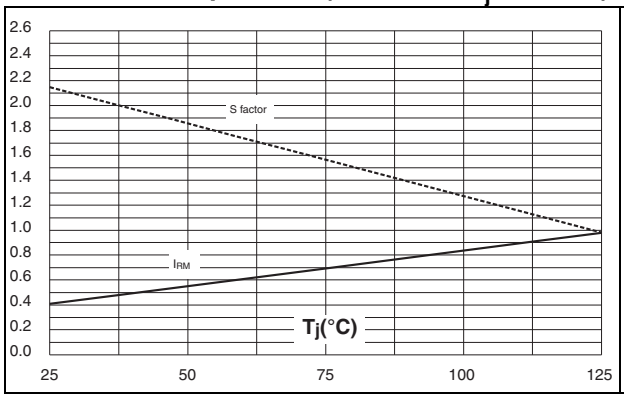


Figure 6. Transient peak forward voltage versus dI_F/dt (90% confidence)

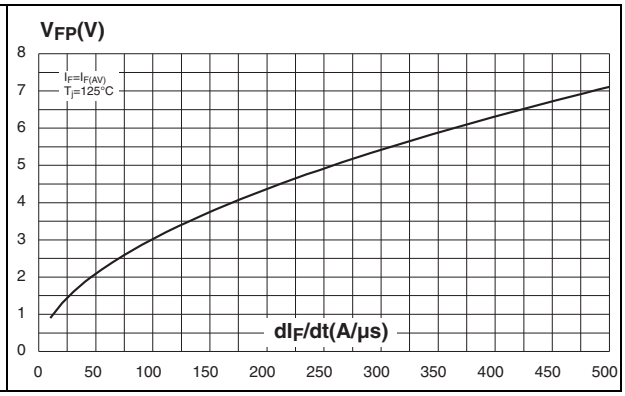
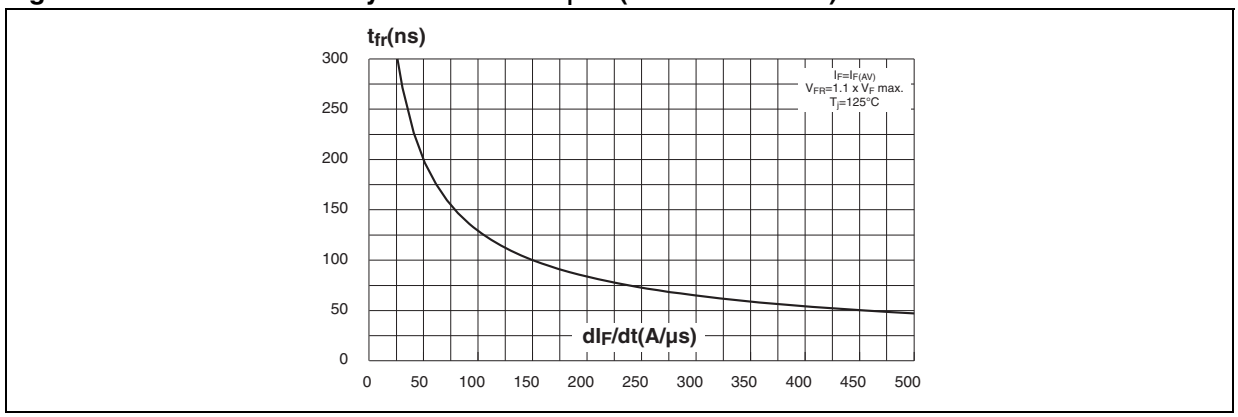


Figure 7. Forward recovery time versus dI_F/dt (90% confidence)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction

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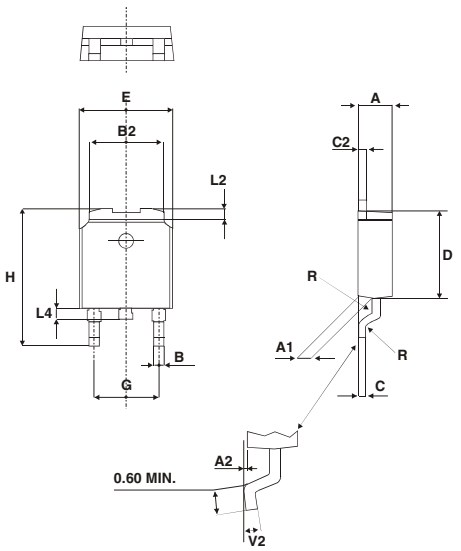
Table 6. DPAK dimensions



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°

3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1003SBY-TR	STTH1003SY	DPAK	0.3 g	2500	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
24-Oct-2012	1	Initial release.

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