

High voltage ultrafast rectifier

Main product characteristics

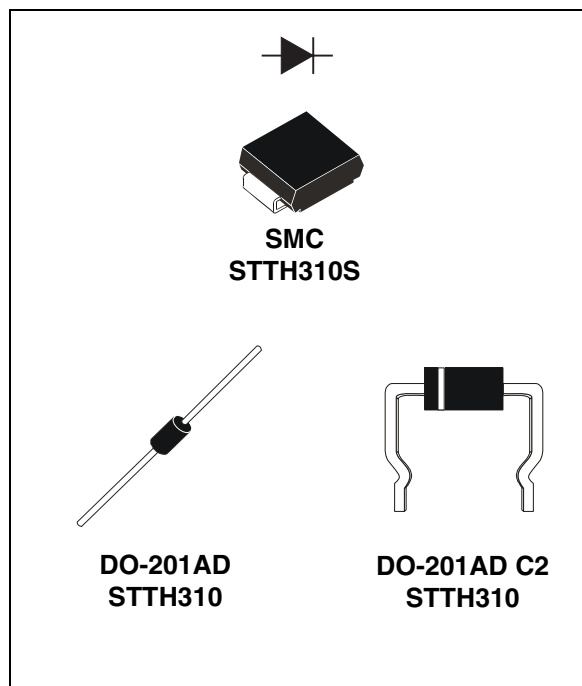
$I_{F(AV)}$	3 A
V_{RRM}	1000 V
T_j	175° C
V_F (max)	1.42 V
t_{rr} (max)	75 ns

Features and benefits

- Low forward voltage drop
- High reliability
- High surge current capability
- Soft switching for reduced EMI disturbances
- Planar technology

Description

The STTH310, which is using ST ultrafast high voltage planar technology, is specially suited for free-wheeling, clamping, snubbing, demagnetization in power supplies and other power switching applications.



Order codes

Part Number	Marking
STTH310	STTH310B
STTH310RL	STTH310
STTH310S	S10
STTH310-C2	STTH 310

1 Characteristics

Table 1. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
V _{RRM}	Repetitive peak reverse voltage			1000	V
I _{F(AV)}	Average forward current, δ = 0.5	T _L = 75° C δ = 0.5	DO-201AD	3	A
		T _L = 75° C δ = 0.5	SMC	3	
I _{FSM}	Forward surge current	t _p = 8.3 ms Sinusoidal	DO-201AD	55	A
			SMC	45	
T _{stg}	Storage temperature range			- 50 to + 175	°C
T _j	Maximum operating junction temperature			+ 175	°C

Table 2. Thermal parameters

Symbol	Parameter			Value	Unit
$R_{th(j-l)}$	Junction to lead	L = 10 mm	DO-201AD	20	$^\circ\text{C/W}$
			SMC	20	
$R_{th(j-a)}$	Junction to ambient	L = 10 mm	DO-201AD	75	

Table 3. 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
		$T_j = 125^\circ \text{C}$				50	
V_F	Forward voltage drop	$T_j = 25^\circ \text{C}$	$I_F = 3 \text{ A}$			1.7	V
		$T_j = 150^\circ \text{C}$			0.98	1.42	

To evaluate the conduction losses use the following equation: $P = 1.20 \times I_{F(AV)} + 0.075 I_F^2 (RMS)$

Table 4. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	$I_F = 0.5 \text{ A}$ $I_R = 1 \text{ A}$	$I_{rr} = 0.25 \text{ A}$ $T_j = 25^\circ \text{C}$			75	ns
t_{fr}	Forward recovery time	$I_F = 3 \text{ A}$ $dI_F/dt = 50 \text{ A}/\mu\text{s}$				300	ns
V_{FP}	Forward recovery voltage	$V_{FR} = 1.1 \times V_{Fmax}$ $T_j = 25^\circ \text{C}$				12	V

Figure 1. Conduction losses versus average current

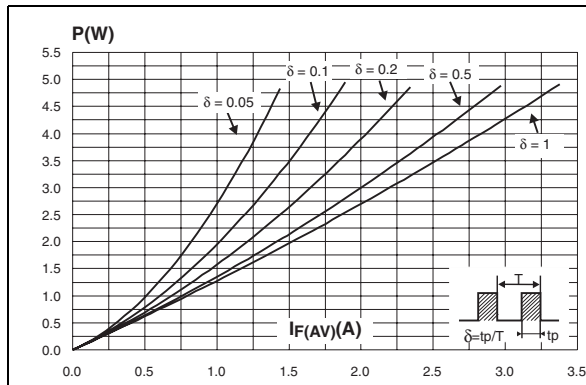


Figure 2. Forward voltage drop versus forward current

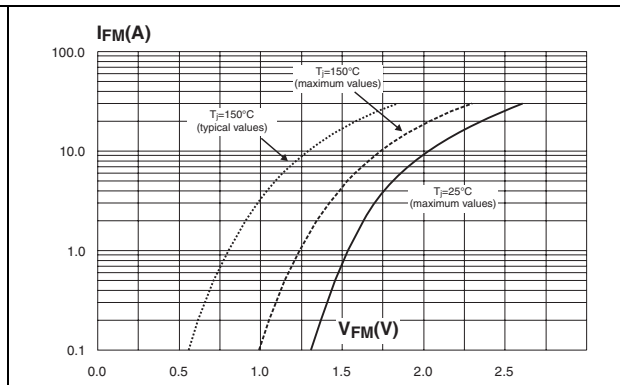


Figure 3. Relative variation of thermal impedance junction ambient versus pulse duration (epoxy FR4, L_{leads} = 10 mm) (DO-201AD)

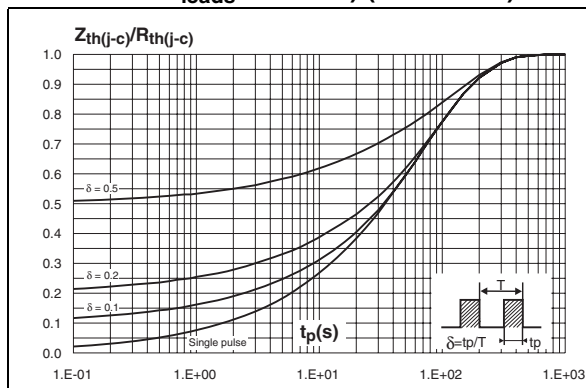


Figure 4. Relative variation of thermal impedance junction ambient versus pulse duration (epoxy FR4, S = 1cm²) (SMC)

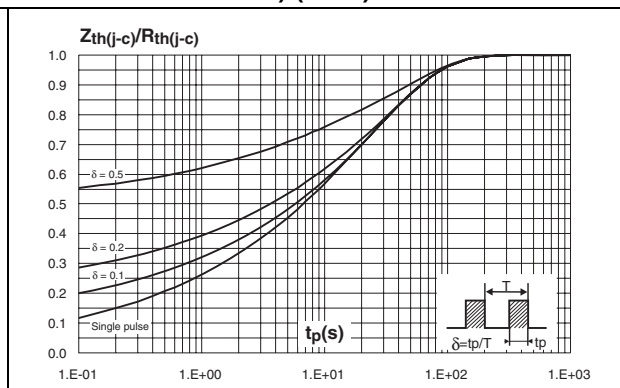
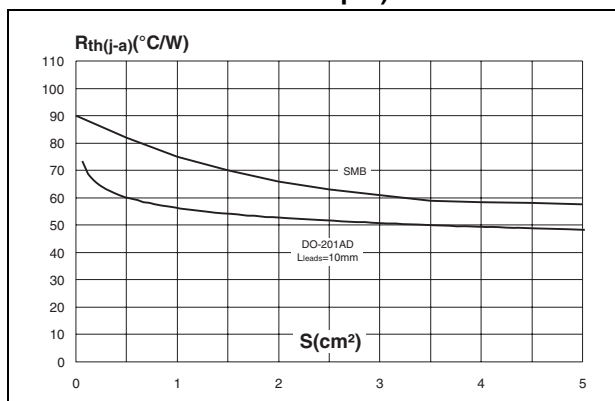


Figure 5. Thermal resistance junction to ambient versus copper surface under each lead (epoxy printed circuit board FR4, copper thickness: 35 μm)



2 Package mechanical data

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

Table 5. SMC Dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

Figure 6. Footprint (dimensions in mm)

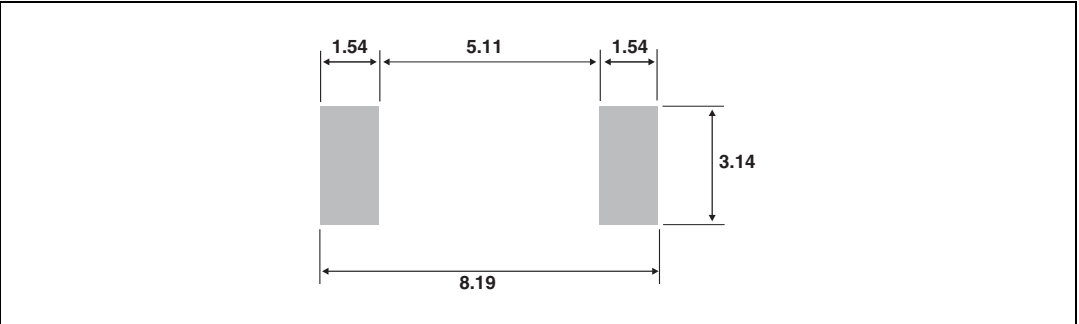


Table 6. DO-201AD dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		9.50		0.374
B	25.40		1.000	
C		5.30		0.209
D		1.30		0.051
E		1.25		0.049
Notes	1 - The lead diameter $\varnothing D$ is not controlled over zone E 2 - The minimum length which must stay straight between the right angles after bending is 0.59" (15mm)			

Table 7. DO-201AD C2 dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			9.5			0.374
B	13.75		17.75	0.541		0.699
C			5.3			0.208
D			1.3			0.051
E	3.1	3.6	4.1	0.122	0.142	0.161
F	2.4	3.15	3.9	0.094	0.124	0.153
G		1.6			0.063	
H	14.9		15.6	0.587		0.614
I	0.5	0.6	0.8	0.019	0.024	0.031
J		18.78			0.739	
K	3.8		4.8	0.150		0.189
Note	The difference between E dimensions on both sides of resinous body (which express the bending centering) mustn't be larger than 0.7 millimeter.					

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.

3 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH310S	S10	SMC	0.245 g	2500	Tape & reel
STTH310	STTH310	DO-201AD	1.16 g	600	Ammopack
STTH310RL	STTH310	DO-201AD	1.16 g	1900	Tape & reel
STTH310-C2	STTH 310	DO-201AD C2	1.12 g	500	Box

4 Revision history

Date	Revision	Description of Changes
Jan-2003	1	First release.
03-Apr-2007	2	DO-201AD C2 package added. SMC Package information updated.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2007 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com