

High efficiency ultrafast diode

Main product characteristics

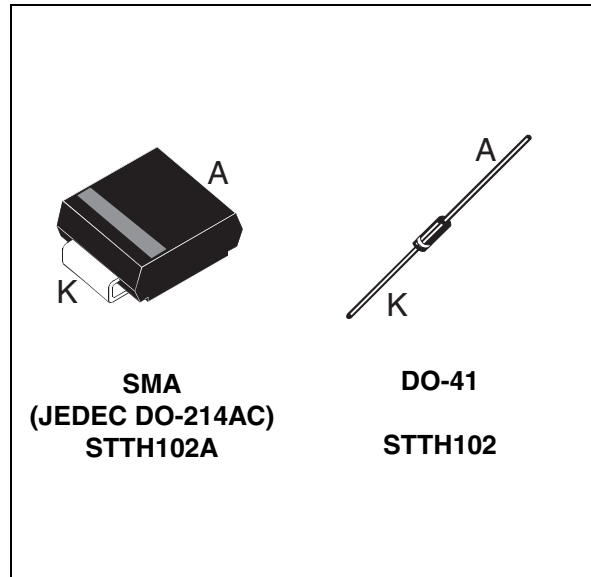
$I_{F(AV)}$	1 A
V_{RRM}	200 V
T_j (max)	175° C
V_F (max)	0.78 V
t_{rr} (max)	20 ns

Features and benefits

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature

Description

The STTH102, which is using ST's new 200 V planar technology, is specially suited for switching mode base drive and transistor circuits. The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.



Order codes

Part Number	Marking
STTH102A	U12
STTH102	STTH102
STTH102RL	STTH102

Table 1. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit	
V_{RRM}	Repetitive peak reverse voltage		200	V	
$I_{F(AV)}$	Average forward current	SMA	$T_L = 148^\circ\text{C}$ $\delta = 0.5$	1	A
		DO-41	$T_L = 130^\circ\text{C}$ $\delta = 0.5$		
I_{FSM}	Surge non repetitive forward current	SMA	$t_p = 10\text{ ms}$ Sinusoidal	40	A
		DO-41		50	
T_{stg}	Storage temperature range		-65 to + 175	°C	
T_j	Maximum operating junction temperature		175	°C	
dV/dt	Critical rate of rise of reverse voltage		10000	V/ μs	

1 Characteristics

Table 2. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-l)}$	Junction to lead	SMA	30	°C/W
		Lead length = 10 mm DO-41	50	

Table 3. Static Electrical Characteristics

Symbol	Parameter	Tests conditions		Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ C$	$V_R = V_{RRM}$			1	μA
		$T_j = 125^\circ C$			1	25	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ C$	$I_F = 700\text{ mA (SMA)}$			0.90	V
			$I_F = 1\text{ A}$			0.97	
		$T_j = 125^\circ C$	$I_F = 1\text{ A}$		0.68	0.78	

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$
2. Pulse test: $t_p = 380\text{ }\mu s$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:
 $P = 0.65 \times I_{F(AV)} + 0.130 I_{F(RMS)}^2$

Table 4. Dynamic electrical characteristics

Symbol	Parameter	Tests conditions		Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ C$	$I_F = 0.5\text{ A}$ $I_{rr} = 0.25\text{ A}$ $I_R = 1\text{ A}$		12	20	ns
t_{fr}	Forward recovery time	$T_j = 25^\circ C$	$I_F = 1\text{ A}$ $di_F/dt = 50\text{ A/ms}$ $V_{FR} = 1.1 \times V_{Fmax}$		50		ns
V_{FP}	Forward recovery voltage	$T_j = 25^\circ C$	$I_F = 1\text{ A}$ $di_F/dt = 50\text{ A/ms}$		1.8		V

Figure 1. Average forward power dissipation versus average forward current (SMA)

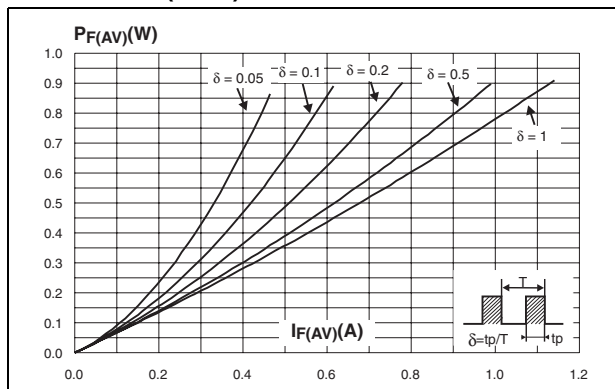


Figure 2. Average forward power dissipation versus average forward current (DO-41)

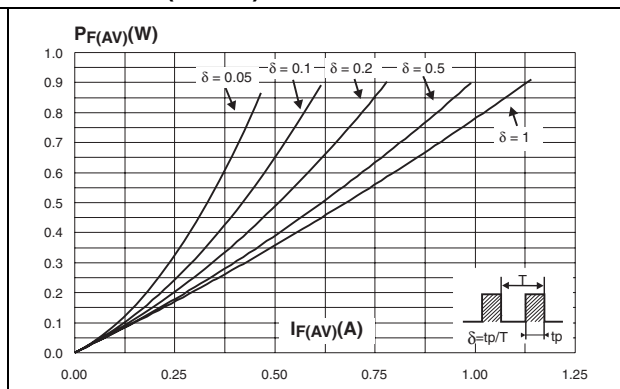


Figure 3. Average forward current versus ambient temperature ($\delta = 0.5$) (SMA)

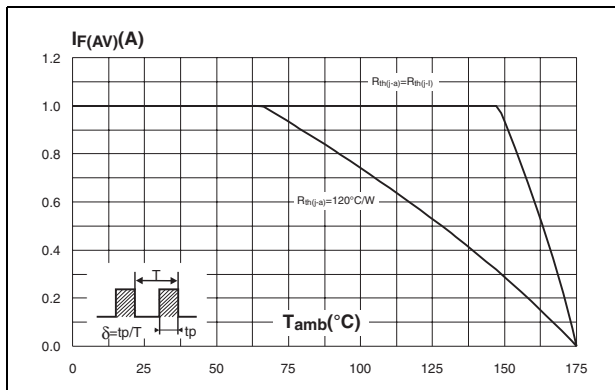


Figure 4. Average forward current versus ambient temperature ($\delta = 0.5$) (DO-41)

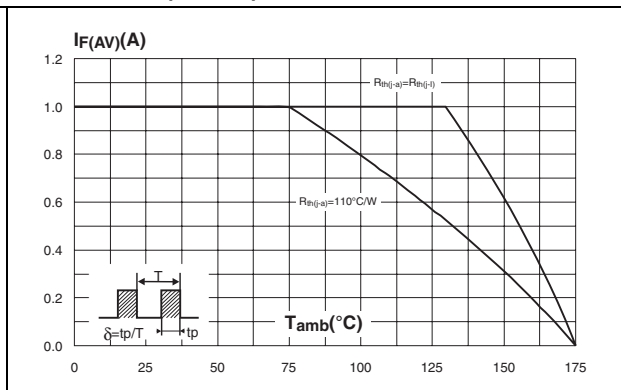


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (epoxy printed circuit board, $e_{Cu} = 35 \mu\text{m}$, recommended pad layout) (SMA)

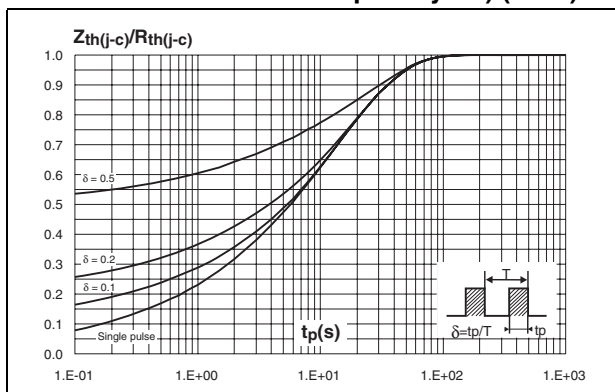


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-41)

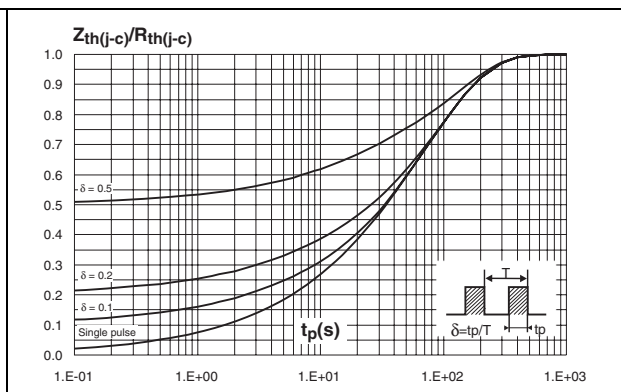


Figure 7. Forward voltage drop versus forward current

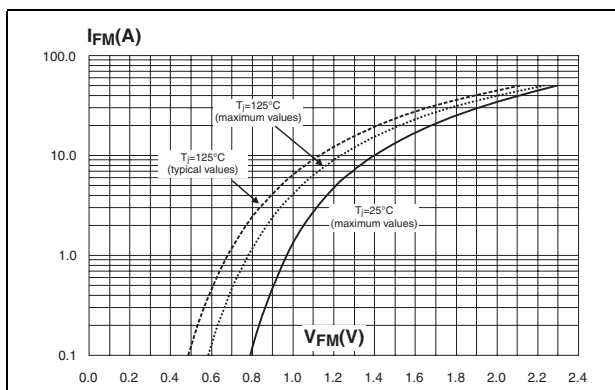


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

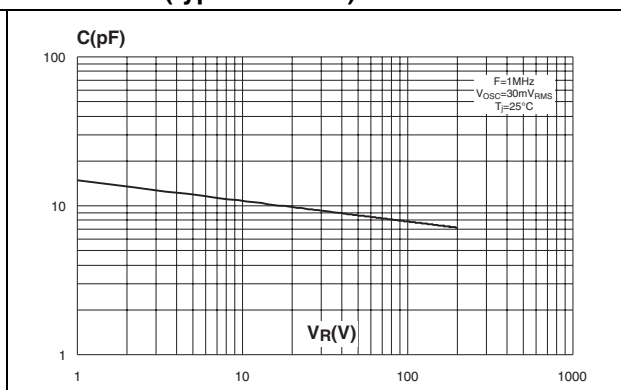


Figure 9. Reverse recovery time versus di_F/dt (90% confidence)

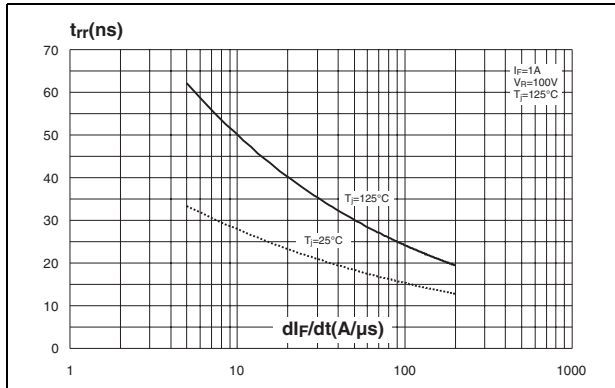


Figure 10. Peak recovery current versus di_F/dt (90% confidence)

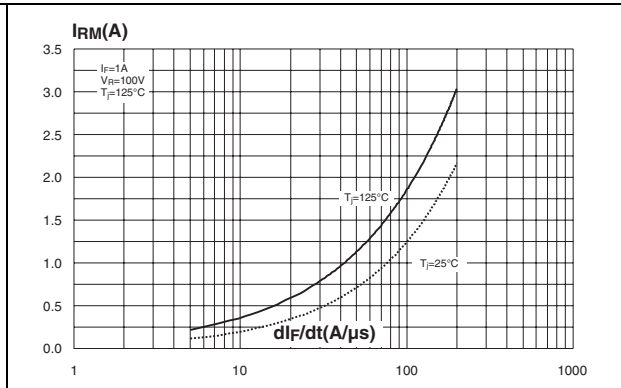


Figure 11. Reverse recovery charges versus di_F/dt (90% confidence)

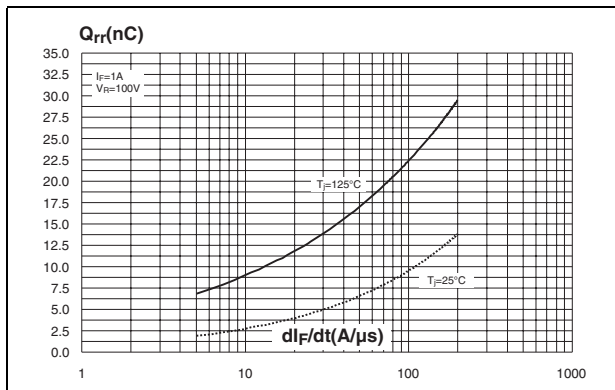


Figure 12. Relative variations of dynamic parameters versus junction temperature

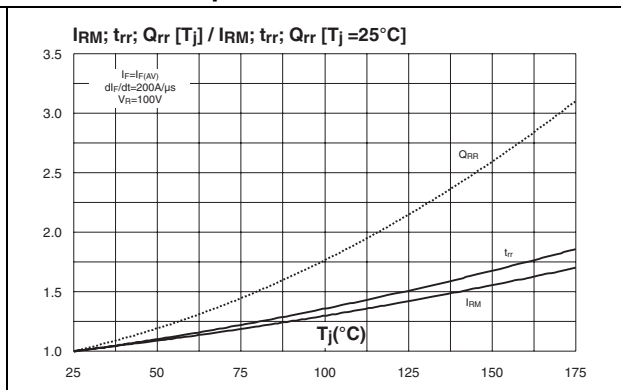


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead (Epoxy printed circuit board FR4, copper thickness: 35 μ m) (SMA)

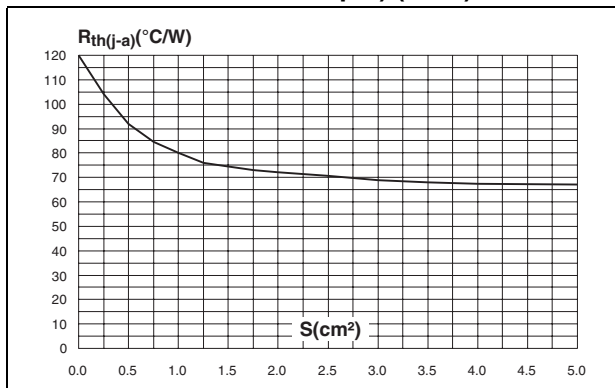
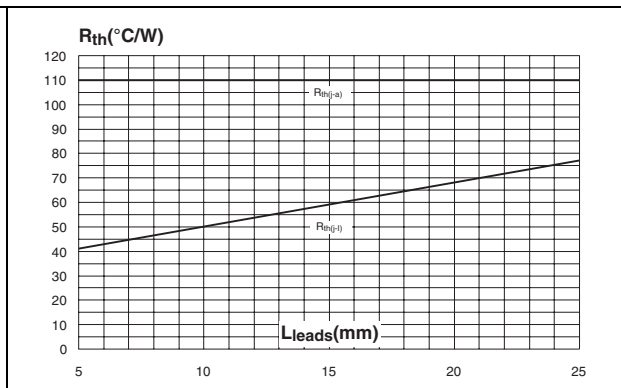


Figure 14. Thermal resistance versus lead length (DO-41)



2 Package information

- Epoxy meets UL94 V0

Table 5. SMA Dimensions

	Ref.	Dimensions			
		Millimeters		Inches	
		Min.	Max.	Min.	Max.
	A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008	
b	1.25	1.65	0.049	0.065	
c	0.15	0.40	0.006	0.016	
D	2.25	2.90	0.089	0.114	
E	4.80	5.35	0.189	0.211	
E1	3.95	4.60	0.156	0.181	
L	0.75	1.50	0.030	0.059	

Figure 15. Footprint (dimensions in mm)

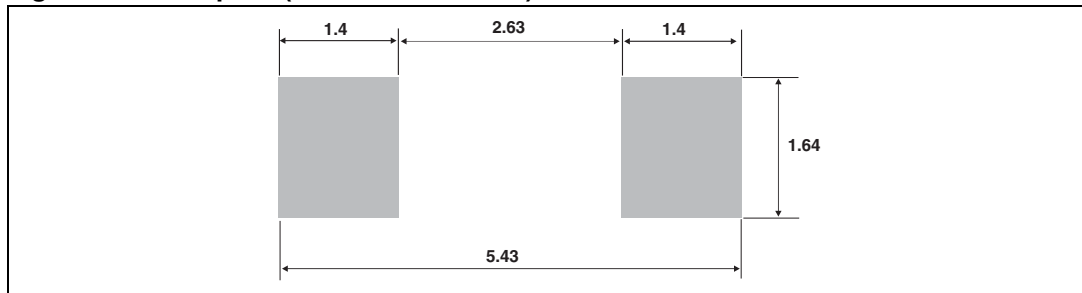


Table 6. DO-41 (Plastic) Package dimensions

	Ref.	Dimensions			
		Millimeters		Inches	
		Min.	Max.	Min.	Max.
	A	4.1	5.20	0.160	0.205
B	2	2.71	0.080	0.107	
C	25.4		1		
D	0.712	0.863	0.028	0.034	

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

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH102A	U12	SMA	0.068 g	5000	Tape and reel
STTH102	STTH102	DO-41	0.34 g	2000	Ammopack
STTH102RL	STTH102	DO-41	0.34 g	5000	Tape and reel

4 Revision history

Date	Revision	Description of Changes
Jul-2003	2A	Last update.
Aug-2004	3	SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106inc.) to 2.03mm (0.080). SMA and DO-41 datasheets merged
27-Jun-2005	4	Corrected error in title.
21-Nov-2006	5	Reformatted to current standards. Added Table 4. Dynamic electrical characteristics. Updated dimensions table for DO-41 Plastic package. Added cathode bands to package illustrations.

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.

© 2006 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