

Automotive high efficiency ultrafast diode

Features

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature
- ECOPACK®2 compliant component
- AEC-Q101 qualified

Description

The STTH102-Y, 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 for automotive.

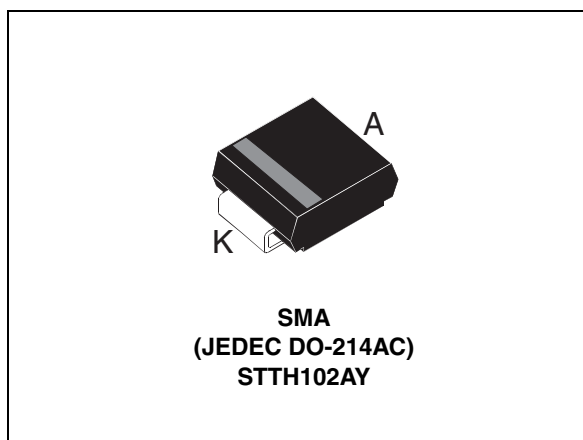


Table 1. Device summary

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

1 Characteristics

Table 2. Absolute rating (limiting values)

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

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to lead	30	°C/W

Table 4. Static Electrical Characteristics

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$			1	μ A
		$T_j = 125\text{ °C}$			1	25	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 700\text{ mA}$			0.90	V
			$I_F = 1\text{ A}$			0.97	
		$T_j = 125\text{ °C}$	$I_F = 1\text{ A}$		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: $P = 0.65 \times I_{F(AV)} + 0.130 I_F^2(RMS)$

Table 5. Dynamic electrical characteristics

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

Figure 1. Average forward power dissipation versus average forward current

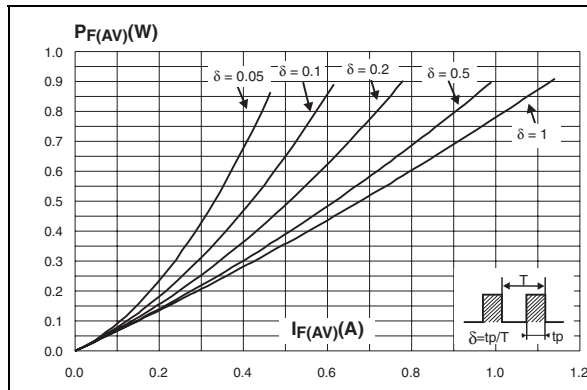
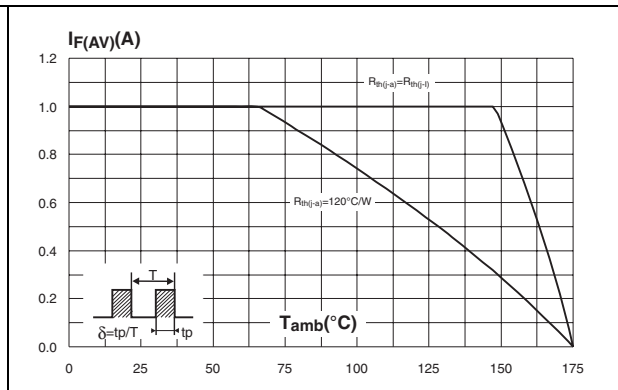
Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$)

Figure 3. Relative variation of thermal impedance junction to ambient versus pulse duration

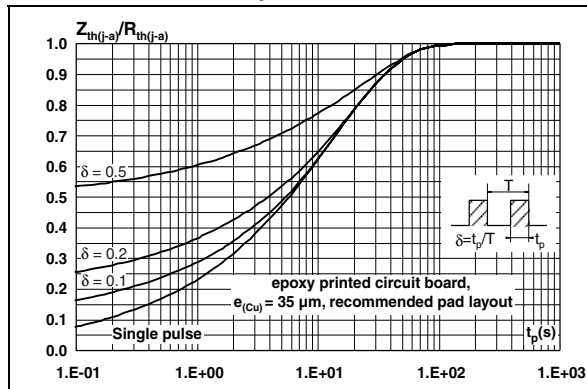


Figure 4. Forward voltage drop versus forward current

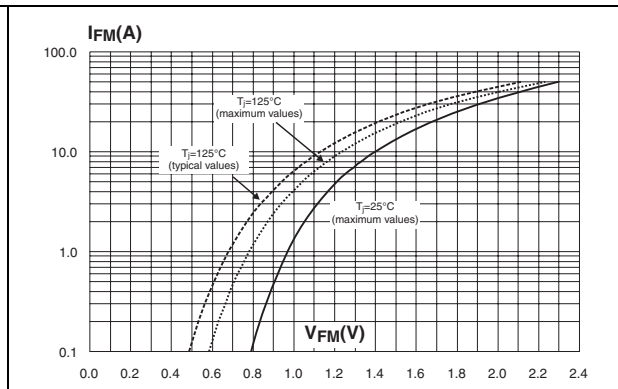


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

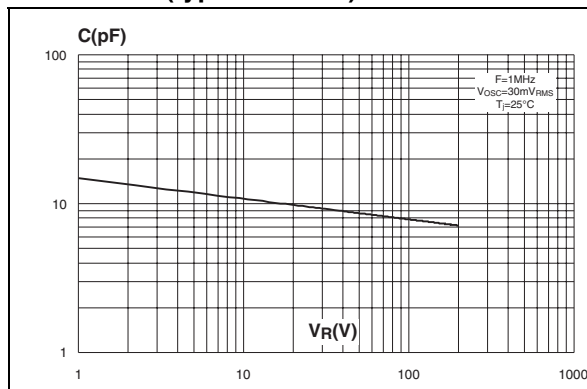
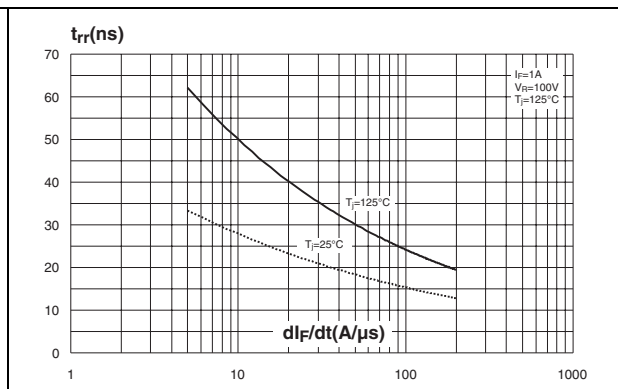
Figure 6. Reverse recovery time versus dI_F/dt (90% confidence)

Figure 7. Peak recovery current versus dl_F/dt (90% confidence)

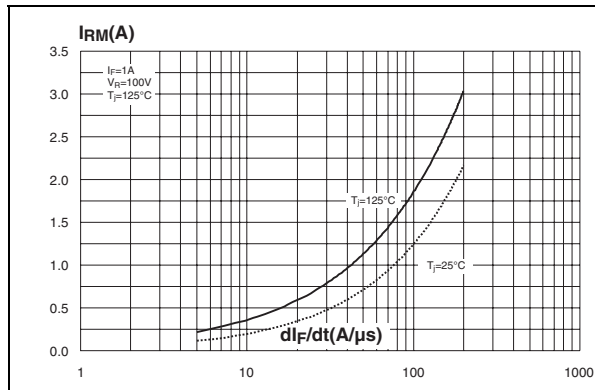


Figure 8. Reverse recovery charges versus dl_F/dt (90% confidence)

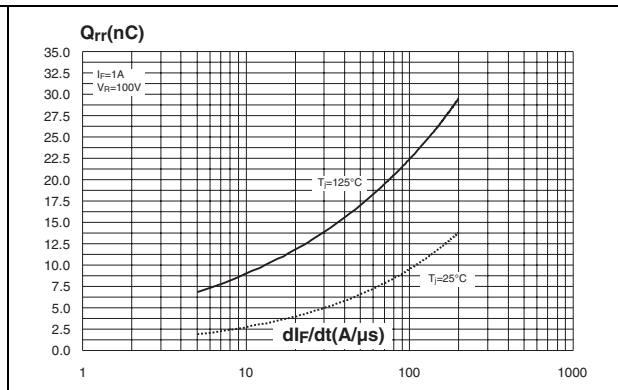


Figure 9. Relative variations of dynamic parameters versus junction temperature

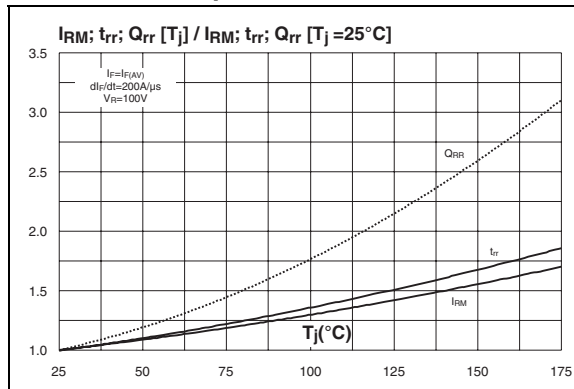
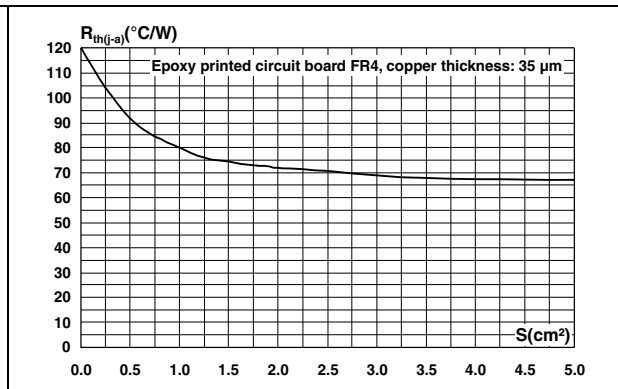


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead



2 Package information

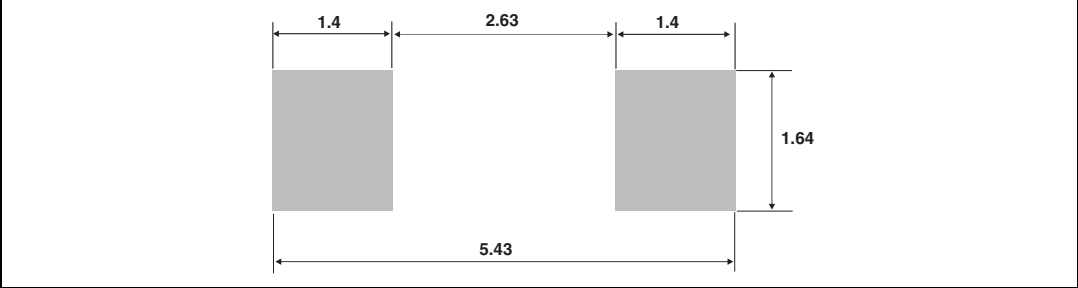
- Epoxy meets UL94 V0
- Lead-free packages

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. 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 11. Footprint (dimensions in mm)



3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH102AY	U12Y	SMA	0.068 g	5000	Tape and reel

4 Revision history

Table 8. Revision history

Date	Revision	Changes
07-Nov-2011	1	Initial release.

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 TWO AUTHORIZED ST REPRESENTATIVES, 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.

© 2011 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 - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com