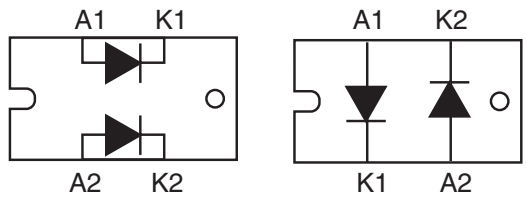
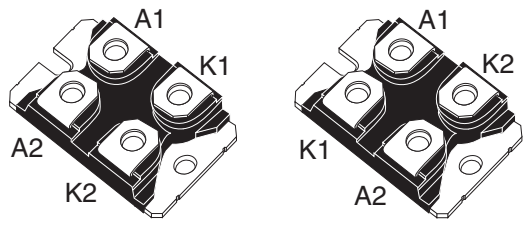
STTH6110TV

Ultrafast recovery - high voltage diode

Main product characteristics

$I_{F(AV)}$	2 x 30 A
V_{RRM}	1000 V
T_j	150° C
V_F (typ)	1.3 V
t_{rr} (typ)	42 ns





ISOTOP
STTH6110TV1

ISOTOP
STTH6110TV2

Features and benefits

- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature
- Insulated package
  - Electrical insulation = 2500 V_{RMS}
    Capacitance = 45 pF

Description

The compromise-free, high quality design of this diode has produced a device with low leakage current, regularly reproducible characteristics and intrinsic ruggedness. These characteristics make it ideal for heavy duty applications that demand long term reliability.

These demanding applications include industrial power supplies, motor control, and similar industrial systems that require rectification and freewheeling. These diodes also fit into auxiliary functions such as snubber, bootstrap, and demagnetization applications.

The improved performance in low leakage current, and therefore thermal runaway guard band, is an immediate advantage for reducing maintenance of the equipment

Order codes

Part Number	Marking
STTH6110TV1	STTH6110TV1
STTH6110TV2	STTH6110TV2

1 Characteristics

Table 1. Absolute ratings (limiting values per diode at 25° C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			1000	V
$I_{F(RMS)}$	RMS forward current			60	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	Per diode	T_c = 60° C	30	A
I_{FRM}	Repetitive peak forward current	t_p = 5 µs, F = 5 kHz square		350	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms Sinusoidal		240	A
T_{stg}	Storage temperature range			-65 to + 150	°C
T_j	Maximum operating junction temperature			150	°C

Table 2. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.4	° C/W
		Total	0.75	
$R_{th(c)}$	Coupling thermal resistance		0.1	

When the diodes are used simultaneously:
$\Delta T_{j(diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			15	µA
		T_j = 125° C			10	100	
V_F(2)	Forward voltage drop	T_j = 25° C	I_F = 30 A			2.0	V
		T_j = 100° C			1.4	1.8	
		T_j = 150° C			1.3	1.7	

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:
$P = 1.3 \times I_{F(AV)} + 0.013\ I_F{}^2{}_{(RMS)}$

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V, T_j = 25° C			100	ns
		I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V, T_j = 25° C		53	70	
		I_F = 1 A, dI_F/dt = -200 A/µs, V_R = 30 V, T_j = 25° C		42	55	
I_{RM}	Reverse recovery current	I_F = 30 A, dI_F/dt = -200 A/µs, V_R = 600 V, T_j = 125° C		24	32	A
S	Softness factor	I_F = 30 A, dI_F/dt = -200 A/µs, V_R = 600 V, T_j = 125° C		1		
t_{fr}	Forward recovery time	I_F = 30 A dI_F/dt = 100 A/µs V_{FR} = 1.5 x V_{Fmax}, T_j = 25° C			450	ns
V_{FP}	Forward recovery voltage	I_F = 30 A, dI_F/dt = 100 A/µs, T_j = 25° C		5		V

Figure 1. Conduction losses versus average current

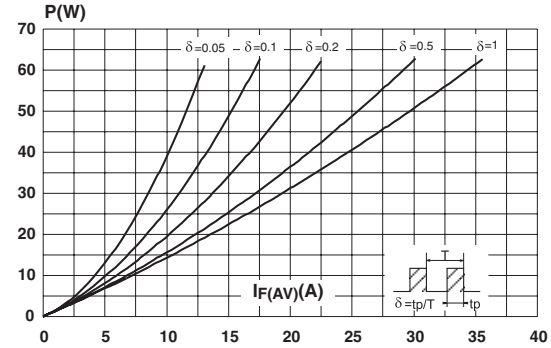


Figure 2. Forward voltage drop versus forward current

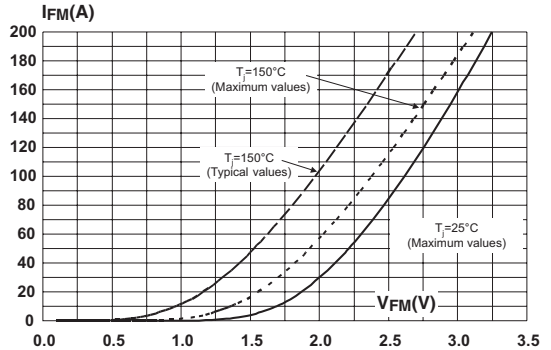


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

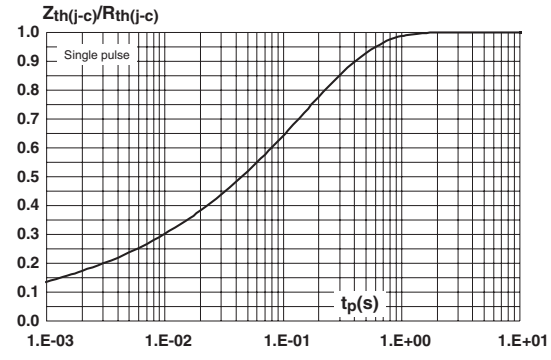


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

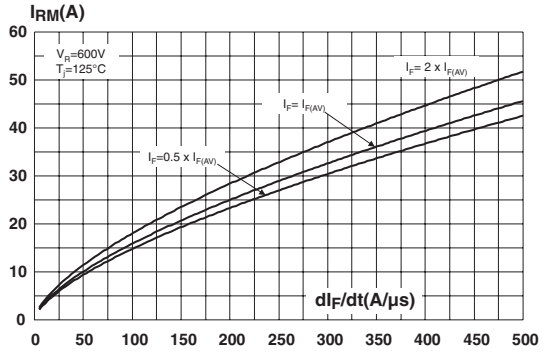


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

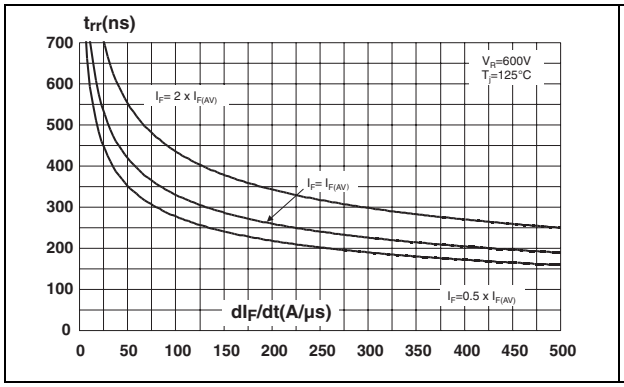


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

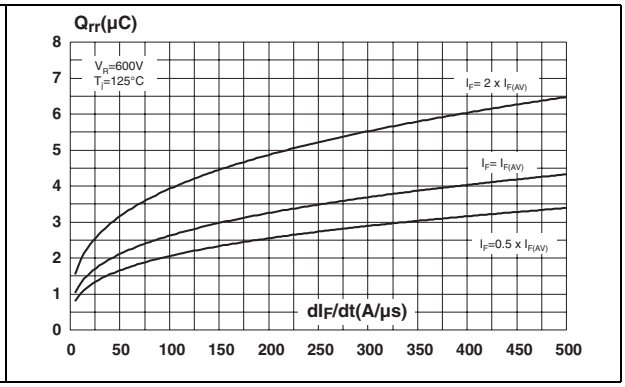


Figure 7. Softness factor versus dI_F/dt (typical values)

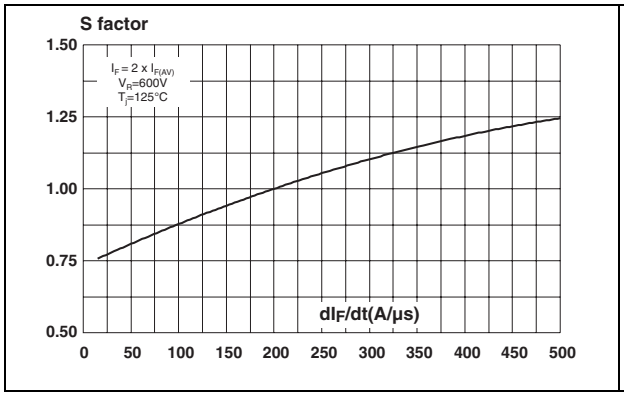


Figure 8. Relative variations of dynamic parameters versus junction temperature

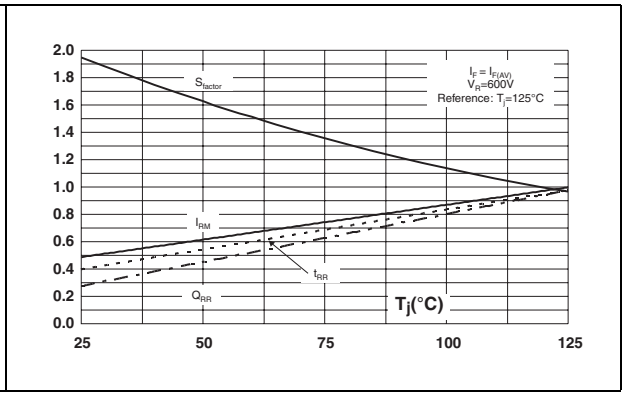


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

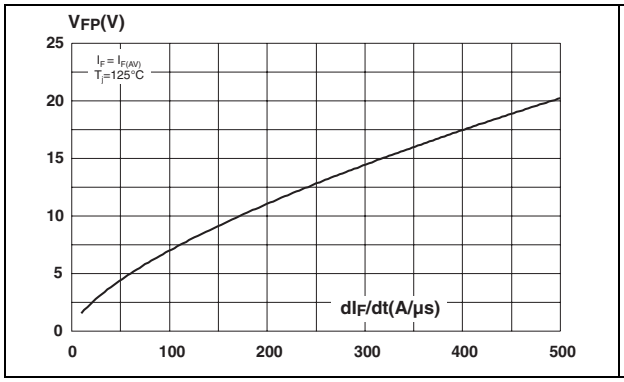


Figure 10. Forward recovery time versus dI_F/dt (typical values)

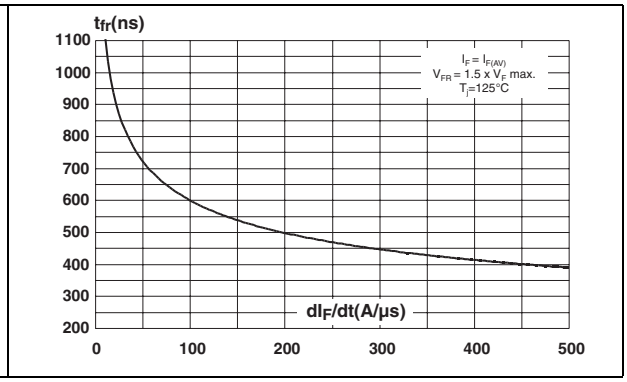
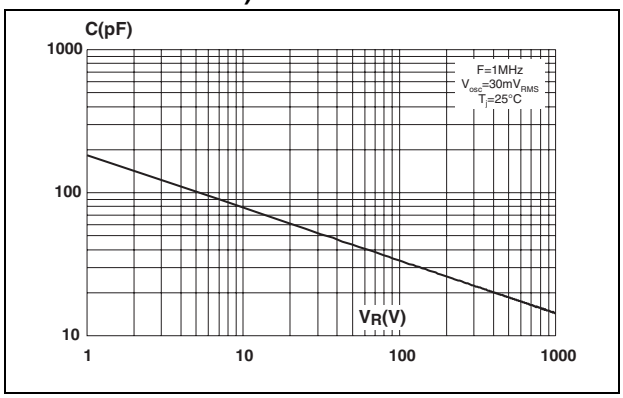


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

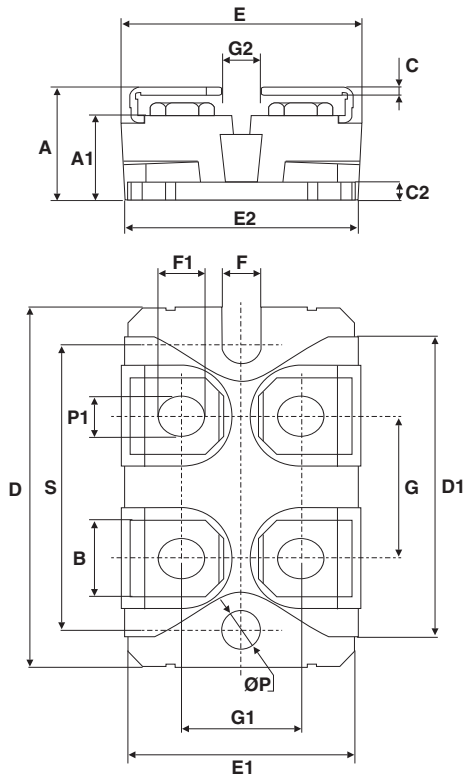


2 Package information

Epoxy meets UL94, V0

Cooling method: by conduction (C)

Table 5. ISOTOP dimensions



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	11.80	12.20	0.465	0.480
A1	8.90	9.10	0.350	0.358
B	7.8	8.20	0.307	0.323
C	0.75	0.85	0.030	0.033
C2	1.95	2.05	0.077	0.081
D	37.80	38.20	1.488	1.504
D1	31.50	31.70	1.240	1.248
E	25.15	25.50	0.990	1.004
E1	23.85	24.15	0.939	0.951
E2	24.80 typ.		0.976 typ.	
G	14.90	15.10	0.587	0.594
G1	12.60	12.80	0.496	0.504
G2	3.50	4.30	0.138	0.169
F	4.10	4.30	0.161	0.169
F1	4.60	5.00	0.181	0.197
P	4.00	4.30	0.157	0.69
P1	4.00	4.40	0.157	0.173
S	30.10	30.30	1.185	1.193

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
STTH6110TV1	STTH6110TV1	ISOTOP	27 g	10	Tube
STTH6110TV2	STTH6110TV2	ISOTOP	27 g	10	Tube

4 Revision history

Date	Revision	Description of Changes
22-Feb-2006	1	First issue.

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 AUTHORIZE REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, 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.

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.

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