

### Main product characteristics

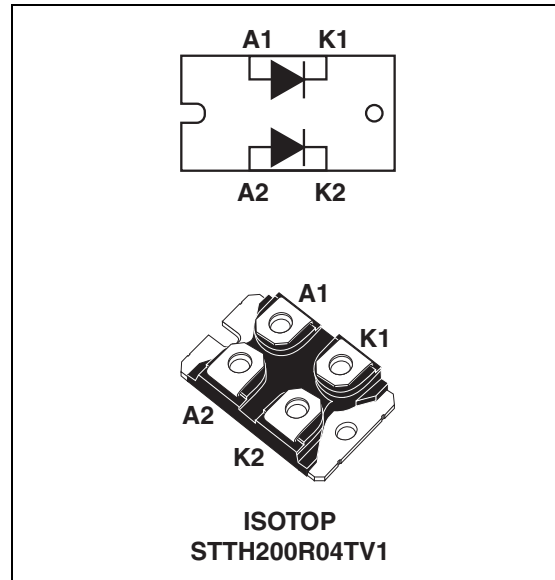
$I_{F(AV)}$	2 x 100 A
$V_{RRM}$	400 V
$T_j$	150° C
$V_F$ (typ)	0.87 V
$t_{rr}$ (typ)	40 ns

### Features and benefits

- Ultrafast
- Very low switching losses
- High frequency and high pulsed current operation
- Low leakage current
- Insulated package:
  - ISOTOP
    - Electrical insulation = 2500 V<sub>RMS</sub>
    - Capacitance = 45 pF

### Description

The STTH200R04TV series uses ST's new 400 V planar Pt doping technology. The STTH200R04 is specially suited for switching mode base drive and transistor circuits, such as welding equipment.



### Order codes

Part Number	Marking
STTH200R04TV1	STTH200R04TV1

# 1 Characteristics

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

Symbol	Parameter		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage		400	V	
V <sub>RSM</sub>	Non repetitive peak reverse voltage		400	V	
I <sub>F(RMS)</sub>	RMS forward current	Per diode	150	A	
I <sub>F(AV)</sub>	Average forward current, $\delta = 0.5$	Per diode	T <sub>c</sub> = 80° C	100	A
		Per package	T <sub>c</sub> = 65° C	200	A
I <sub>FRM</sub>	Repetitive peak forward current	t <sub>p</sub> = 5 $\mu$ s, F = 1 kHz square	2000	A	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms Sinusoidal	1000	A	
T <sub>stg</sub>	Storage temperature range		-65 to + 150	°C	
T <sub>j</sub>	Maximum operating junction temperature		150	°C	

**Table 2. Thermal parameters**

Symbol	Parameter		Value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	0.50	° C/W
		Total	0.30	
R <sub>th(c)</sub>	Coupling thermal resistance		0.1	

When the diodes are used simultaneously:

$$\Delta T_{j(\text{diode1})} = P_{(\text{diode1})} \times R_{\text{th(j-c)}} \text{ (per diode)} + P_{(\text{diode2})} \times R_{\text{th(c)}}$$

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25° C	V <sub>R</sub> = V <sub>RRM</sub>			80	$\mu$ A
		T <sub>j</sub> = 125° C			80	800	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25° C	I <sub>F</sub> = 100 A			1.35	V
		T <sub>j</sub> = 100° C			0.95	1.2	
		T <sub>j</sub> = 150° C			0.87	1.1	

1. Pulse test: t<sub>p</sub> = 5 ms,  $\delta < 2\%$

2. Pulse test: t<sub>p</sub> = 380  $\mu$ s,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.8 \times I_{F(AV)} + 0.003 \times I_{F(RMS)}^2$$

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 1 \text{ A}$ , $di_F/dt = -50 \text{ A}/\mu\text{s}$ , $V_R = 30 \text{ V}$ , $T_j = 25^\circ \text{ C}$			100	ns
		$I_F = 1 \text{ A}$ , $di_F/dt = -100 \text{ A}/\mu\text{s}$ , $V_R = 30 \text{ V}$ , $T_j = 25^\circ \text{ C}$		50	70	
		$I_F = 1 \text{ A}$ , $di_F/dt = -200 \text{ A}/\mu\text{s}$ , $V_R = 30 \text{ V}$ , $T_j = 25^\circ \text{ C}$		40	55	
$I_{RM}$	Reverse recovery current	$I_F = 100 \text{ A}$ , $di_F/dt = -200 \text{ A}/\mu\text{s}$ , $V_R = 320 \text{ V}$ , $T_j = 125^\circ \text{ C}$		22	32	A
$Q_{RR}$	Reverse recovery charges	$I_F = 100 \text{ A}$ , $di_F/dt = -200 \text{ A}/\mu\text{s}$ , $V_R = 320 \text{ V}$ , $T_j = 125^\circ \text{ C}$		1500	2900	nC
S	Softness factor	$I_F = 100 \text{ A}$ , $di_F/dt = -200 \text{ A}/\mu\text{s}$ , $V_R = 320 \text{ V}$ , $T_j = 125^\circ \text{ C}$		0.4		
$t_{fr}$	Forward recovery time	$I_F = 100 \text{ A}$ , $di_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.5 \times V_{Fmax}$ , $T_j = 25^\circ \text{ C}$		1000		ns
$V_{FP}$	Forward recovery voltage	$I_F = 100 \text{ A}$ , $di_F/dt = 100 \text{ A}/\mu\text{s}$ , $T_j = 25^\circ \text{ C}$		3.5		V

Figure 1. Conduction losses versus average current

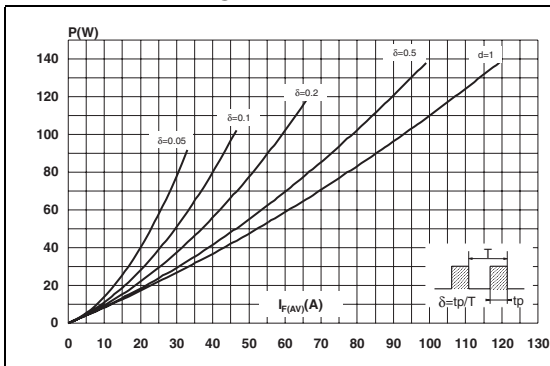


Figure 2. Forward voltage drop versus forward current

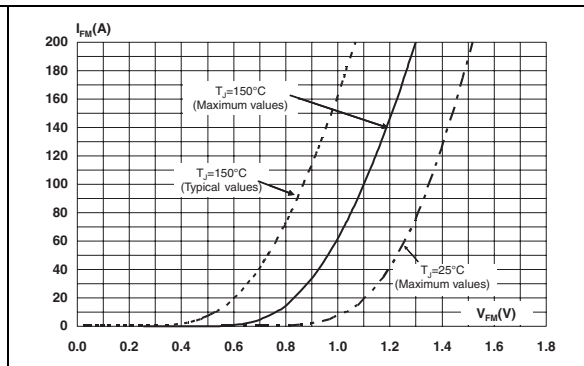


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

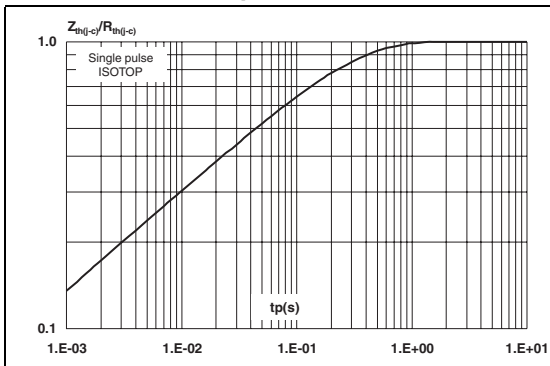
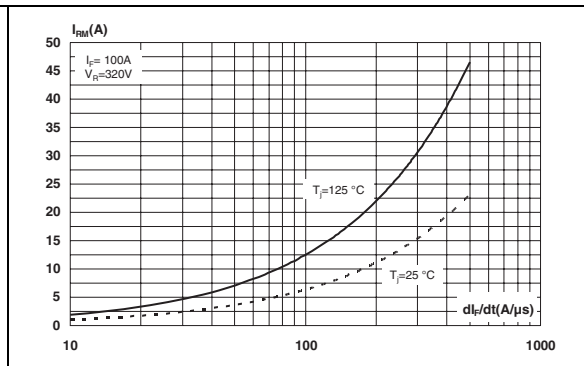
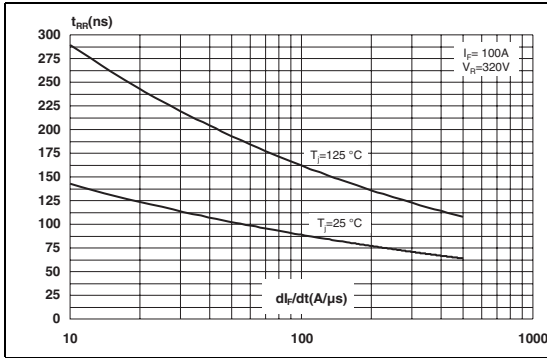


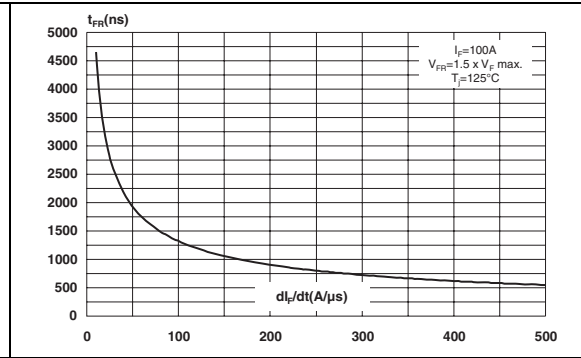
Figure 4. Peak reverse recovery current versus di\_F/dt (typical values)



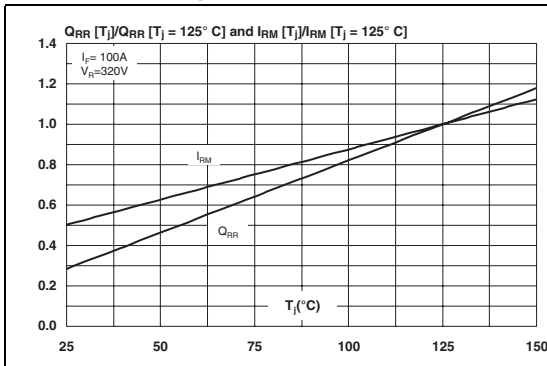
**Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)**



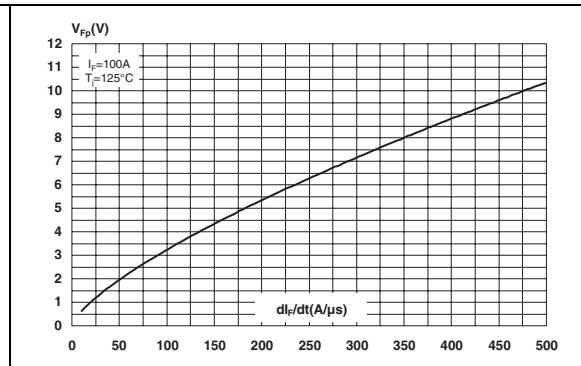
**Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)**



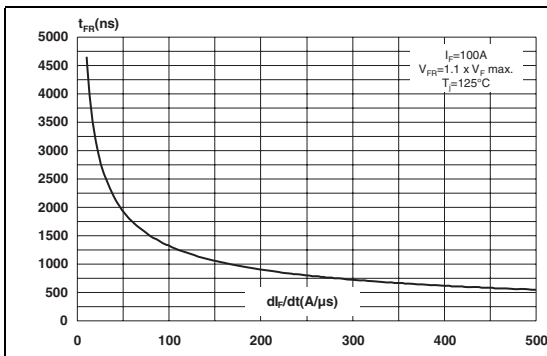
**Figure 7. Relative variations of dynamic parameters versus junction temperature**



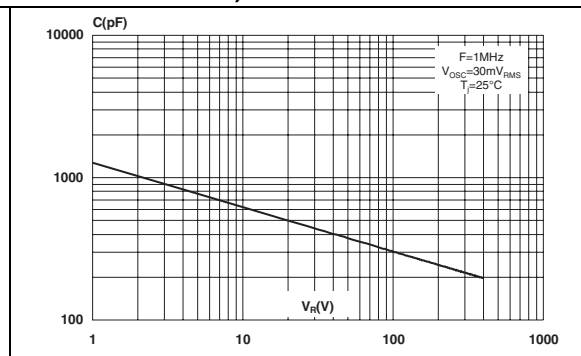
**Figure 8. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



**Figure 9. Forward recovery time versus  $di_F/dt$  (typical values)**



**Figure 10. 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](http://www.st.com).

### 3 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH200R04TV1	STTH200R04TV1	ISOTOP	27 g	10	Tube

### 4 Revision history

Date	Revision	Description of Changes
31-Mar-2007	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 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](http://www.st.com)

