

## STTH200R04TV

## Ultrafast recovery diode

#### Main product characteristics

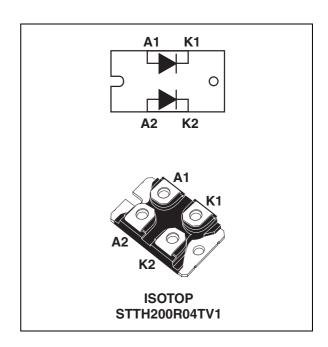
I <sub>F(AV)</sub>	2 x 100 A
V <sub>RRM</sub>	400 V
Tj	150° C
V <sub>F (typ)</sub>	0.87 V
t <sub>rr (typ)</sub>	40 ns

#### 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

Characteristics STTH200R04TV

#### 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	Repetitive peak reverse voltage			V
V <sub>RSM</sub>	Non repetitive peak reverse voltage			400	V
I <sub>F(RMS)</sub>	RMS forward current Per diode		150	Α	
1	Average forward current, $\delta = 0.5$	Per diode	T <sub>c</sub> = 80° C	100	Α
I <sub>F(AV)</sub>	Average lorward current, 0 = 0.5	Per package	T <sub>c</sub> = 65° C	200	Α
I <sub>FRM</sub>	Repetitive peak forward current $t_p = 5 \mu s$ , $F = 1 kHz square$		2000	Α	
I <sub>FSM</sub>	Surge non repetitive forward current   t <sub>p</sub> = 10 ms Sinusoidal		1000	Α	
T <sub>stg</sub>	Storage temperature range			-65 to + 150	°C
Tj	Maximum operating junction tempera	Maximum operating junction temperature			°C

Table 2. Thermal parameters

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

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

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур	Max.	Unit
I <sub>B</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25° C	V - V			80	
'R`	neverse leakage current	T <sub>j</sub> = 125° C	$V_R = V_{RRM}$		80	800	μΑ
		T <sub>j</sub> = 25° C				1.35	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 100° C	I <sub>F</sub> = 100 A		0.95	1.2	V
		T <sub>j</sub> = 150° C			0.87	1.1	

<sup>1.</sup> Pulse test:  $t_p = 5$  ms,  $\delta < 2$  %

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To evaluate the conduction losses use the following equation:

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

<sup>2.</sup> Pulse test:  $t_{\rm p}$  = 380  $\mu$ s,  $\delta$  < 2 %

STTH200R04TV Characteristics

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit
		$I_F = 1 \text{ A, } dI_F/dt = -50 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$			100	
t <sub>rr</sub>	Reverse recovery time	$I_F = 1 \text{ A, } dI_F/dt = -100 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$		50	70	ns
		$I_F = 1 \text{ A, } dI_F/dt = -200 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$		40	55	
I <sub>RM</sub>	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	Α
Q <sub>RR</sub>	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 <sub>fr</sub>	Forward recovery time	$I_F = 100 \text{ A}$ $dI_F/dt = 100 \text{ A/µs}$ $V_{FR} = 1.5 \text{ x } V_{Fmax}, T_j = 25^{\circ} \text{ C}$		1000		ns
V <sub>FP</sub>	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

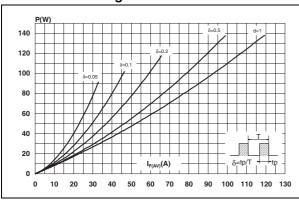


Figure 2. Forward voltage drop versus forward current

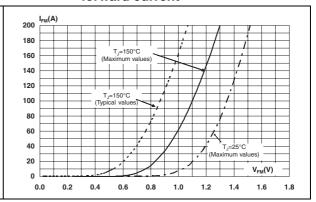
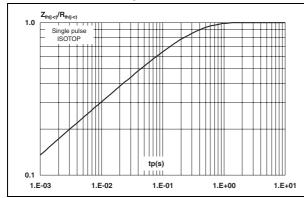
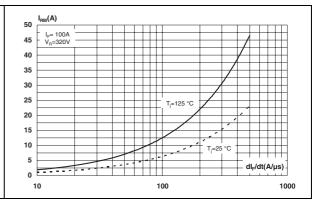


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

Figure 4. Peak reverse recovery current versus dl<sub>F</sub>/dt (typical values)

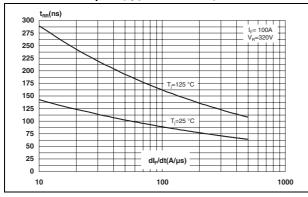




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Figure 5. Reverse recovery time versus dl<sub>F</sub>/dt (typical values)

Figure 6. Reverse recovery charges versus dl<sub>F</sub>/dt (typical values)



5000 t<sub>FR</sub>(ns)

4500 V<sub>FR</sub>=1.5 x V<sub>F</sub> max.

4000 V<sub>FR</sub>=1.5 x V<sub>F</sub> max.

7=125°C

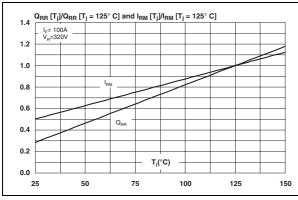
2000

1500

0 100 200 300 400 500

Figure 7. Relative variations of dynamic parameters versus junction temperature

Figure 8. Transient peak forward voltage versus dl<sub>F</sub>/dt (typical values)



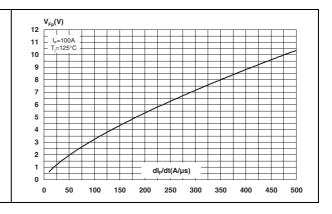
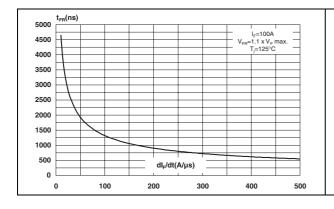
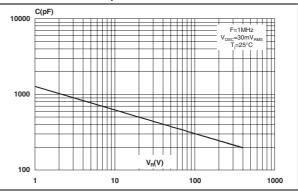


Figure 9. Forward recovery time versus dl<sub>F</sub>/dt Figure 10. Junctio (typical values)

Junction capacitance versus reverse voltage applied (typical values)





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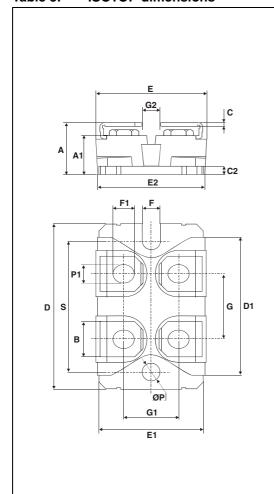
STTH200R04TV Package information

## 2 Package information

Epoxy meets UL94, V0

Cooling method: by conduction (C)

Table 5. ISOTOP dimensions



	Dimensions				
Ref.	Millin	neters	Inc	hes	
	Min.	Max.	Min.	Max.	
Α	11.80	12.20	0.465	0.480	
A1	8.90	9.10	0.350	0.358	
В	7.8	8.20	0.307	0.323	
С	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	
Е	25.15	25.50	0.990	1.004	
E1	23.85	24.15	0.939	0.951	
E2	24.80	0 typ.	0.97	6 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	
Р	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.

Ordering information STTH200R04TV

# 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

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