

## **STTH12012TV**

## Ultrafast recovery - 1200 V diode

## Main product characteristics

I <sub>F(AV)</sub>	2 x 60 A
V <sub>RRM</sub>	1200 V
Tj	150° C
V <sub>F</sub> (typ)	1.30 V
t <sub>rr</sub> (typ)	50 ns

#### Features and benefits

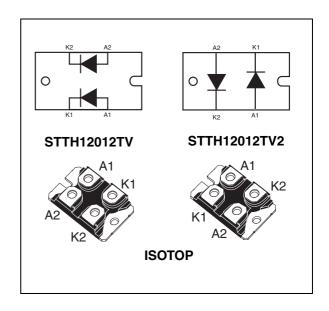
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature
- Insulated package: Electrical insulation = 2500 V<sub>RMS</sub> Capacitance = 45 pF

### **Description**

The 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.

Such demanding applications include industrial power supplies, motor control, and similar mission-critical 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 competitive advantage for this device.



### **Order codes**

Part Number	Marking
STTH12012TV1	STTH12012TV1
STTH12012TV2	STTH12012TV2

**Characteristics** STTH12012TV

#### **Characteristics** 1

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

Symbol	Parameter			Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage	Repetitive peak reverse voltage			V
I <sub>F(RMS)</sub>	RMS forward current			150	Α
I <sub>F(AV)</sub>	Average forward current, $\delta = 0.5$	Average forward current, $\delta = 0.5$ $T_c = 45^{\circ}$ C per diode		60	Α
I <sub>FRM</sub>	Repetitive peak forward current	t <sub>p</sub> = 5 μs, F = 5 kHz square		600	Α
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms Sinusoidal	420	Α	
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
D	Junction to case	Per diode	0.74	
$R_{th(j-c)}$		Total	0.42	°C/W
R <sub>th(c)</sub>	Coupling thermal resistance		0.1	

When the diodes are used simultaneously:  $\Delta T_{j(diode1)} = P_{(diode1)} x R_{th(j-c)}$  (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			30	^
'R`	Reverse leakage current $T_j = 125^{\circ} \text{ C}$ $V_R = V_{RRM}$	VR = VRRM		30	300	μΑ	
		T <sub>j</sub> = 25° C				2.25	
V <sub>F</sub> <sup>(2)</sup> Forward voltage drop	T <sub>j</sub> = 125° C	I <sub>F</sub> = 60 A		1.35	2.05	V	
		T <sub>j</sub> = 150° C			1.30	1.95	

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

To evaluate the conduction losses use the following equation: P = 1.50 x  $I_{F(AV)}$  + 0.0075  $I_{F}^{2}$ <sub>(RMS)</sub>

$$P = 1.50 \text{ x } I_{F(AV)} + 0.0075 I_{F}^{2}(RMS)$$

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<sup>2.</sup> Pulse test:  $t_p$  = 380  $\mu$ s,  $\delta$  < 2 %

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Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit
		$I_F = 1 \text{ A, } dI_F/dt = -50 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$			125	
t <sub>rr</sub>	Reverse recovery time	$I_F = 1 \text{ A, } dI_F/dt = -100 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$		63	85	ns
		$I_F = 1 \text{ A, } dI_F/dt = -200 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$		50	70	
I <sub>RM</sub>	Reverse recovery current	$I_F = 60 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s},$ $V_R = 600 \text{ V}, T_j = 125^{\circ} \text{ C}$		32	45	Α
S	Softness factor	$I_F = 60 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s},$ $V_R = 600 \text{ V}, T_j = 125^{\circ} \text{ C}$		1		
t <sub>fr</sub>	Forward recovery time	$I_F = 60 \text{ A}$ $dI_F/dt = 100 \text{ A/}\mu\text{s}$ $V_{FR} = 1.5 \text{ x } V_{Fmax}, T_j = 25^{\circ} \text{ C}$			750	ns
V <sub>FP</sub>	Forward recovery voltage	$I_F = 60 \text{ A}, dI_F/dt = 100 \text{ A/}\mu\text{s},$ $T_j = 25^{\circ} \text{ C}$		4.5		V

Figure 1. Conduction losses versus average current

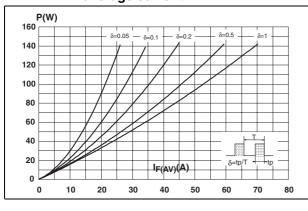
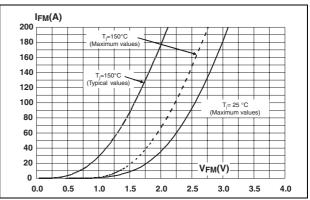


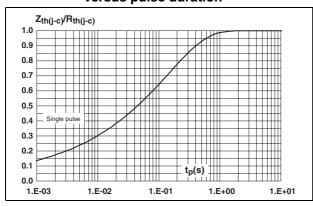
Figure 2. Forward voltage drop versus forward current



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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)



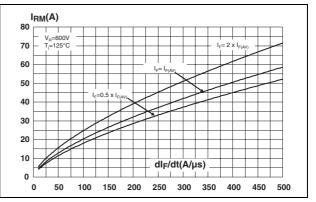
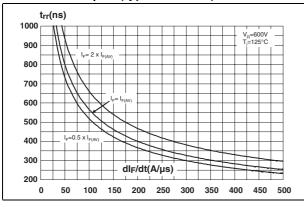


Figure 5. Reverse recovery time versus dl<sub>F</sub>/dt (typical values)

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



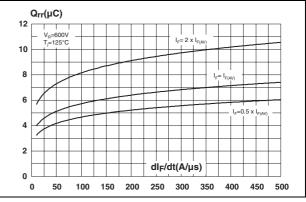
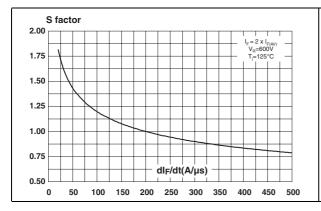
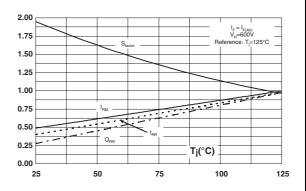


Figure 7. Softness factor versus dl<sub>F</sub>/dt (typical values)

Figure 8. Relative variations of dynamic parameters versus junction temperature



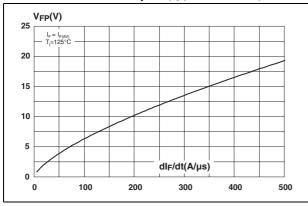


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Figure 9. Transient peak forward voltage versus dl<sub>F</sub>/dt (typical values)

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



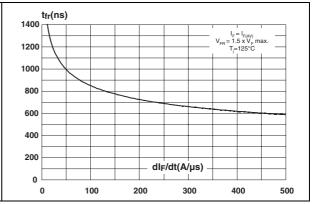
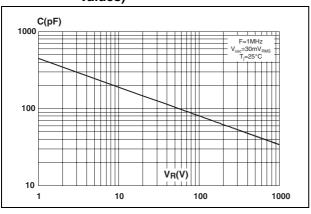


Figure 11. Junction capacitance versus reverse voltage applied (typical values)



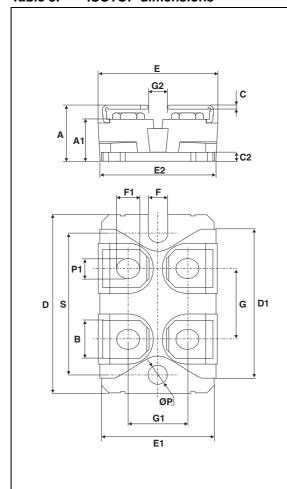
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# 2 Package mechanical data

Epoxy meets UL94, V0

Cooling method: by conduction (C)

Table 5. ISOTOP dimensions



	DIMENSIONS			
REF.	Millim	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.

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# **3** Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH12012TV1	STTH12012TV1	ISOTOP	27 g	10	Tube
STTH12012TV2	STTH12012TV2	ISOTOP	27 g	10	Tube

# 4 Revision history

Date	Revision	Description of Changes
02-Mar-2006	1	First issue.

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