

# STTH6010

# Ultrafast recovery - high voltage diode

### Main product characteristics

I <sub>F(AV)</sub>	60 A
V <sub>RRM</sub>	1000 V
Тj	175° C
V <sub>F</sub> (typ)	1.3 V
t <sub>rr</sub> (typ)	49 ns

## Features and benefits

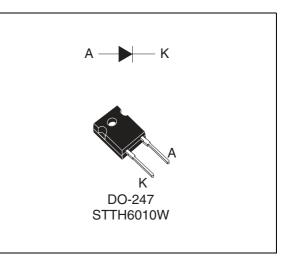
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature

## 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
STTH6010W	STTH6010W

1/8

# 1 Characteristics

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

Symbol	Parameter			Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage			1000	V
I <sub>F(RMS)</sub>	RMS forward current	RMS forward current			А
I <sub>F(AV)</sub>	Average forward current, $\delta = 0.5$ $T_c = 75^{\circ} C$		60	А	
I <sub>FRM</sub>	Repetitive peak forward current	Repetitive peak forward current $t_p = 5 \ \mu s$ , F = 5 kHz square		450	А
I <sub>FSM</sub>	Surge non repetitive forward current	400	А		
T <sub>stg</sub>	Storage temperature range			-65 to + 175	°C
Тj	Maximum operating junction temperature			175	°C

#### Table 2.Thermal parameters

Symbol	Parameter	Value	Unit
R <sub>th(j-c)</sub>	Junction to case	0.78	°C/W

#### Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур	Max.	Unit
I <sub>B</sub> <sup>(1)</sup>	Reverse leakage current	$T_j = 25^\circ C$	V - V			20	μA
'R`´	neverse leakage current	T <sub>j</sub> = 125° C	V <sub>R</sub> = V <sub>RRM</sub>		20	200	μΑ
		$T_j = 25^\circ C$				2.0	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 100° C	I <sub>F</sub> = 60 A		1.4	1.8	V
		T <sub>j</sub> = 150° C			1.3	1.7	

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

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

To evaluate the conduction losses use the following equation:

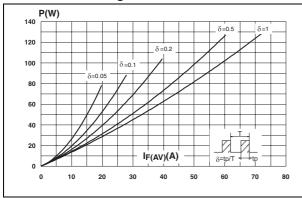
$$P = 1.3 \text{ x } I_{F(AV)} + 0.0067 I_{F}^{2}(RMS)$$

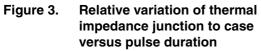


Table 4. Dynamic cha	aracteristics
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Symbol	Parameter	Test conditions	Min.	Тур	Max.	Unit
		$\label{eq:IF} \begin{array}{l} I_F = 1 \ A, \ dI_F/dt = \text{-50 } A/\mus, \\ V_R = 30 \ V, \ T_j = 25^\circ \ C \end{array}$			115	
t <sub>rr</sub>	Reverse recovery time	$\label{eq:IF} \begin{array}{l} I_F = 1 \mbox{ A, } dI_F/dt = -100 \mbox{ A/}\mu s, \\ V_R = 30 \mbox{ V, } T_j = 25^\circ \mbox{ C} \end{array}$		61	80	ns
	$\label{eq:IF} \begin{array}{l} I_{F} = 1 \ A, \ dI_{F}/dt = \text{-200 } A/\mus, \\ V_{R} = 30 \ V, \ T_{j} = 25^{\circ} \ C \end{array}$		49	65		
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} $		31	40	А
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	$I_F = 60 \text{ A} \qquad dI_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.5 \text{ x} \text{ V}_{Fmax},   \text{T}_\text{j} = 25^\circ \text{ C}$			750	ns
V <sub>FP</sub>	Forward recovery voltage	$I_{F}$ = 60 A, dI_{F}/dt = 100 A/µs, $T_{j}$ = 25° C		4		V

#### Figure 1. **Conduction losses versus** average current





Zth(j-c)/Rth(j-c)

Single

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1.E-02

1.0

0.9

0.8

0.7

0.6

0.5

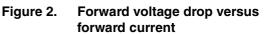
0.4 0.3

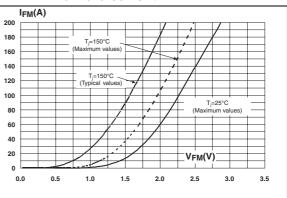
0.2

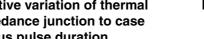
0.1

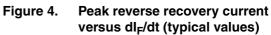
0.0

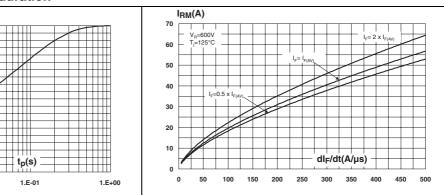
1.E-03



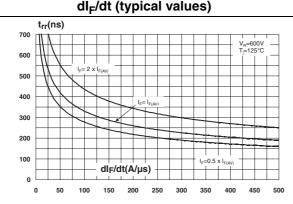




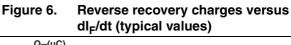


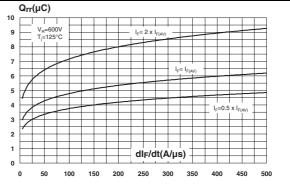






#### Figure 5. Reverse recovery time versus dl<sub>F</sub>/dt (typical values)





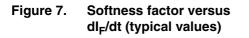
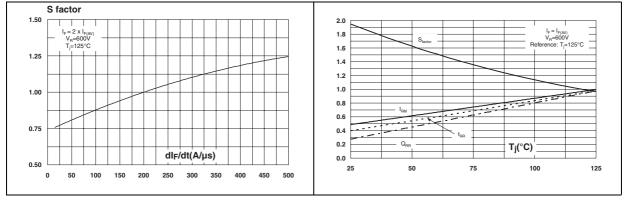
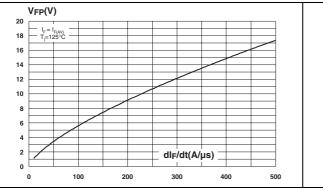


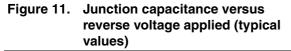
Figure 8. Relative variations of dynamic parameters versus junction temperature

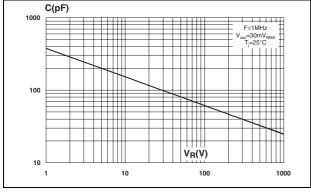




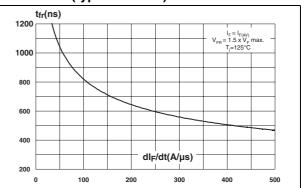
# Figure 9. Transient peak forward voltage versus dl<sub>F</sub>/dt (typical values)







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



## 2 Package information

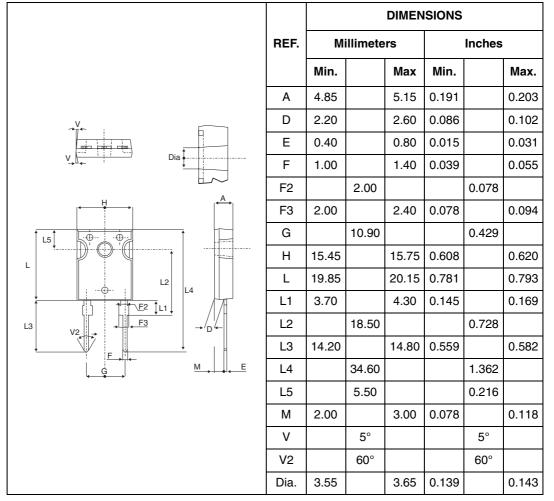
Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque value: 0.80 Nm

Maximum torque value: 1.0 Nm

Table 5.	DO-247 dimensions
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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
STTH6010W	STTH6010W	DO-247	4.4 g	30	Tube

# 4 Revision history

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



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