

## Ultrafast recovery - high voltage diode

### Main product characteristics

$I_{F(AV)}$	60 A
$V_{RRM}$	1000 V
$T_j$	175° C
$V_F$ (typ)	1.3 V
$t_{rr}$ (typ)	49 ns

### Features and benefits

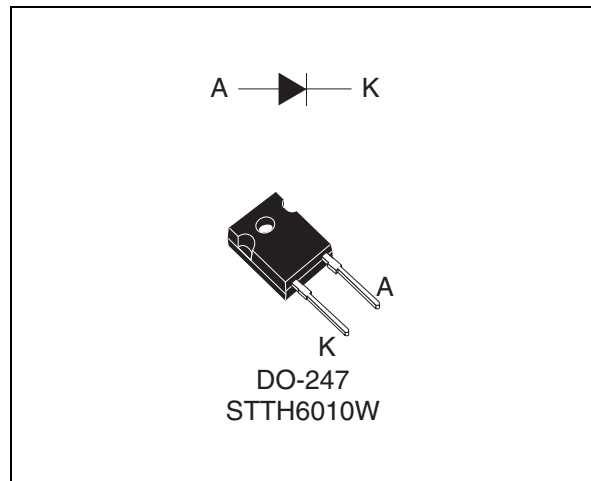
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature

### 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 Characteristics

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

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		1000	V
$I_{F(RMS)}$	RMS forward current		80	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 75^\circ C$	60	A
$I_{FRM}$	Repetitive peak forward current	$t_p = 5 \mu s, F = 5 \text{ kHz square}$	450	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10 \text{ ms Sinusoidal}$	400	A
$T_{stg}$	Storage temperature range		-65 to + 175	°C
$T_j$	Maximum operating junction temperature		175	°C

**Table 2. Thermal parameters**

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	0.78	°C/W

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ C$	$V_R = V_{RRM}$			20	$\mu A$
		$T_j = 125^\circ C$			20	200	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ C$	$I_F = 60 \text{ A}$			2.0	V
		$T_j = 100^\circ C$			1.4	1.8	
		$T_j = 150^\circ C$			1.3	1.7	

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

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

To evaluate the conduction losses use the following equation:

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

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 1\text{ A}$ , $di_F/dt = -50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ , $T_j = 25^\circ\text{ C}$			115	ns
		$I_F = 1\text{ A}$ , $di_F/dt = -100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ , $T_j = 25^\circ\text{ C}$		61	80	
		$I_F = 1\text{ A}$ , $di_F/dt = -200\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ , $T_j = 25^\circ\text{ C}$		49	65	
$I_{RM}$	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	A
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		
$t_{fr}$	Forward recovery time	$I_F = 60\text{ A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.5 \times V_{Fmax}$ , $T_j = 25^\circ\text{ C}$			750	ns
$V_{FP}$	Forward recovery voltage	$I_F = 60\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $T_j = 25^\circ\text{ C}$		4		V

Figure 1. Conduction losses versus average current

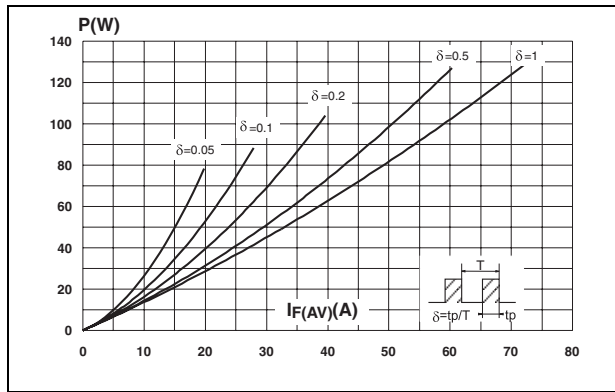


Figure 2. Forward voltage drop versus forward current

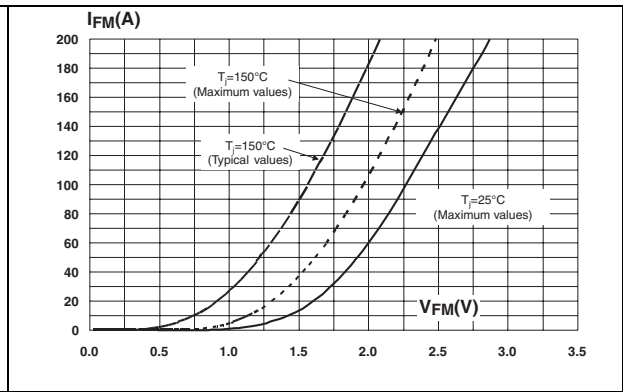


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

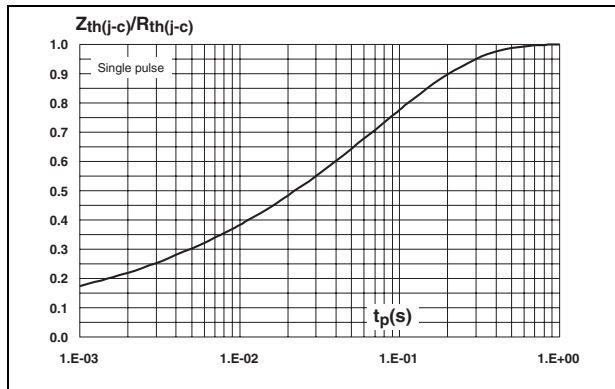


Figure 4. Peak reverse recovery current versus di\_F/dt (typical values)

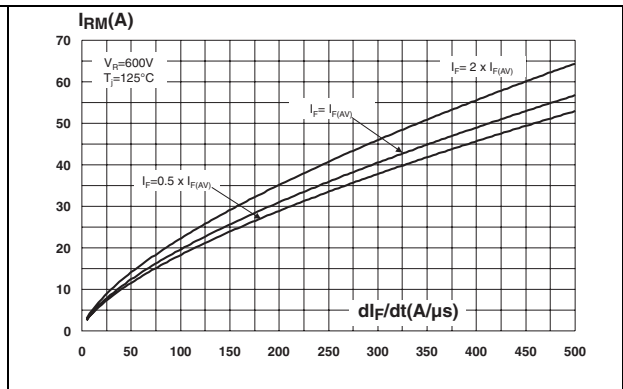


Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)

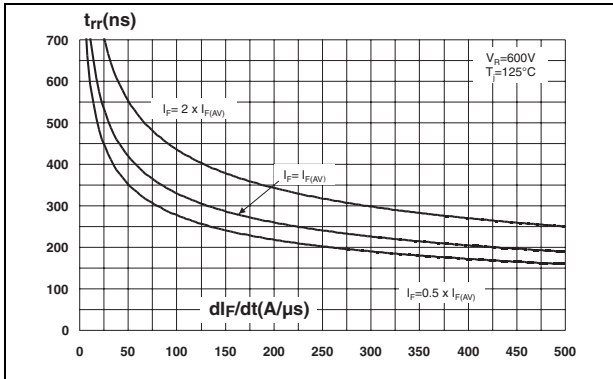


Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)

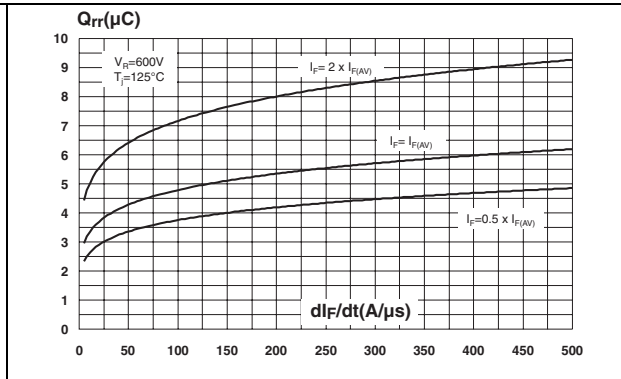


Figure 7. Softness factor versus  $di_F/dt$  (typical values)

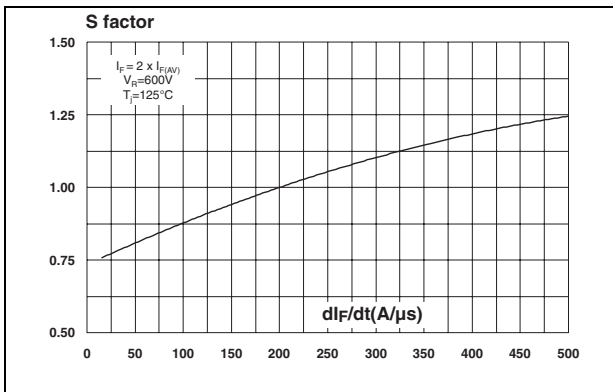
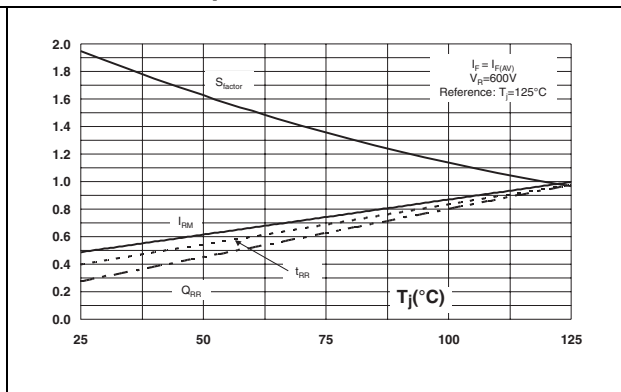
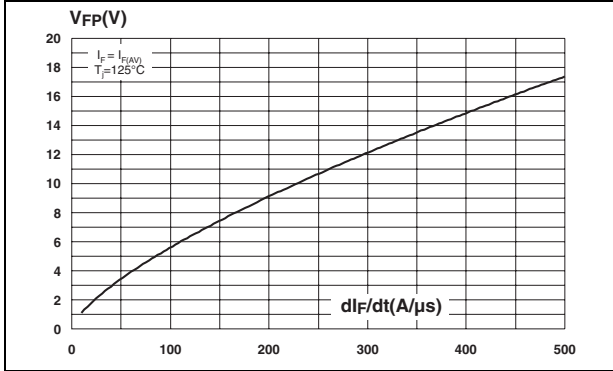


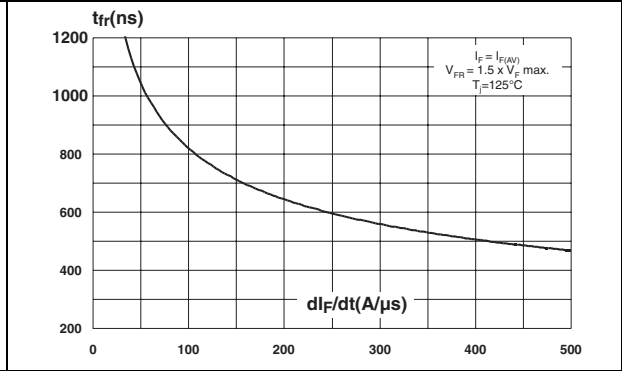
Figure 8. Relative variations of dynamic parameters versus junction temperature



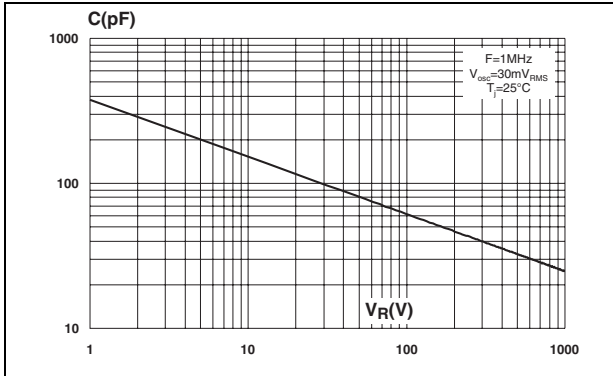
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



**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)

Recommended torque value: 0.80 Nm

Maximum torque value: 1.0 Nm

**Table 5. DO-247 dimensions**

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.		Max.	Min.		Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

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
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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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.