

# New ultrafast and Schottky diodes for welding applications

Two new high performance product families for low power consumption welders



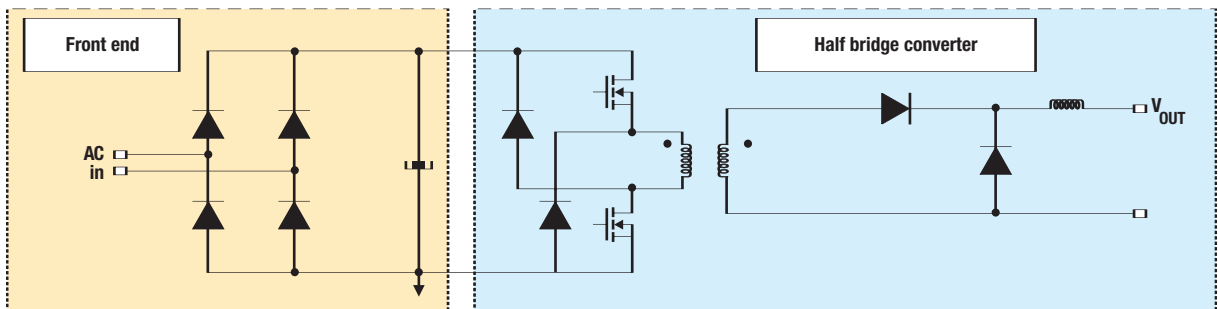
For the new generation of welding equipment, high power secondary rectification produces around half of the power losses, which are mainly caused by conduction in the diodes. To reduce that loss, low forward voltage drop is requested by designers.

After twenty years' experience, working alongside key players in the welding industry, **STMicroelectronics** has released new STPS and STTH diodes perfectly suited to such requirements.

Built on avalanche rating, platinum doping and planar technologies, the new STPS and STTH families of high-current diodes, from 30A up to 200A, deliver optimum solutions and performance with compact packages to the new generation of welding equipment.

## Main application

- Secondary rectification in TIG (tungsten inert gas), MIG (metal inert gas) and plasma welding equipment
- PFC boost diodes and freewheeling diodes in primary stage.



### ■ PFC boost diode

STTHxx06 series

### ■ Primary diodes

STTHxx10 series

STTHxx12 series

### ■ Secondary diodes

■ MIG/TIG type:

STPSxx170/STTHxx02/STTHxx03/STTHxx04 series

■ Plasma type:

STTHxx10/STTHxx12 series (60 to 200A available in ISOTOP package)

## Benefits

- Optimized solution for welding applications
- Lower  $V_F$  to reduce conduction power losses
- Lower  $I_R$  to decrease EMI and thermal runaway risk
- Optimized cost/performance ratio
- Insulated packages available
- STPS: reduction of snubber

## Schottky technology with avalanche rating

The **new STPS family** is designed to work within the avalanche area and can be used close to their intrinsic limits. Thanks to avalanche rating guarantee, the **new 170V Power Schottky diodes** have been designed to advantageously **replace 200V or 300V ultrafast devices**.

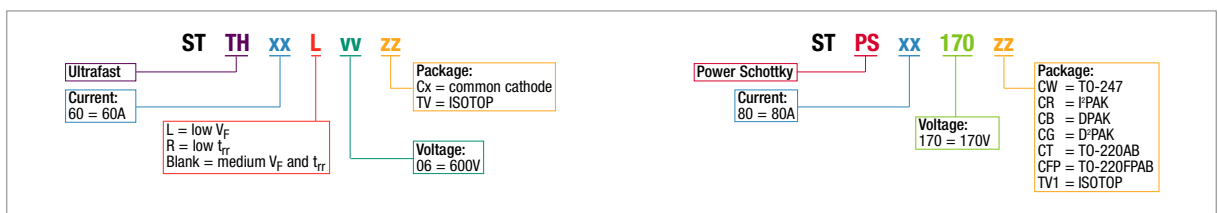
Schottky technology provide real benefits compared to ultrafast, such as:

- Lower forward voltage drop ( $V_F$ ) leads to improved system efficiency as a result of the low rectification loss and consequently **enables heat sink downsizing**
- Negligible reverse recovery characteristics allow **reduction of switching losses** within the diode itself
- The higher junction capacitance filters the voltage transients and oscillations in fast switching mode which leads to the **removal or reduction of the size of the snubber circuit** while **improving the EMI behaviour**

## Main features

- **STPS 170V**
  - Avalanche rated
  - Very low  $V_F$ : 0.7V max. at  $T_j = 125^\circ\text{C}$
  - $T_j$  max set at  $175^\circ\text{C}$  (except for ISOTOP)
- **STTHxx series**
  - 200/300/1000/1200V and 400/600V (L subfamily)
    - Low  $V_F$ : 1.0V max. at  $T_j = 150^\circ\text{C}$
    - $t_{rr}$ : 50ns max. at 1A – 200A/ $\mu\text{s}$  and  $25^\circ\text{C}$
  - 400V and 600V (R subfamily)
    - Low  $V_F$ : 1.4V max. at  $T_j = 150^\circ\text{C}$
    - $t_{rr}$ : 25ns max. at 1A – 200 A/ $\mu\text{s}$  and  $25^\circ\text{C}$
- **All devices**
  - Low  $I_R$ : 100 $\mu\text{A}$  max. at  $T_j = 25^\circ\text{C}$
  - $T_j$  max. set at  $175^\circ\text{C}$  (except for ISOTOP)

## Part numbering scheme



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China +86 21 52574820; France +33 1 55489569; Germany +49 89 4605454; Italy +39 02 8250449; Japan +81 3 57838216; Singapore +65 6481 5124; Sweden +46 8 58774411; Switzerland +41 22 9292900; United Kingdom and Eire +44 1628 890391; USA +1 781 861 2678

Full product information at [www.st.com](http://www.st.com)

Order code: FLDIODE0307

## Ultrafast technology with platinum doping

The **new STTH family** consists of planar structures realized on epitaxial layers.

Thanks to this new platinum doping technology leakage current is reduced by -10% compared to gold doping devices. ST is also developing new products from 200 to 1200V which exhibit **superior  $V_F/t_{rr}$  trade-off** and a **lower exposure to thermal runaway**.

For this reason, all new STTH diodes – except ISOTOP – can be specified at a maximum operating junction temperature of  $175^\circ\text{C}$  without any thermal runaway risk for the application.

The STTH family range is intended to provide a **full range of options to designers**. This broad offering encompasses **many low  $V_F$  or low  $t_{rr}$  trade-offs** to meet the requirements of each application.

As an example, for equipment with two ISOTOP 200A/400V diodes, **power losses can be reduced by up to 80W**.

## Product range

Series	Current (A)	Packages
<b>170V Power Schottky</b>		
STPSxxx170xx	2x15, 2x20, 2x30, 2x40, 2x100	ISOTOP, TO-247, TO-220, D <sup>2</sup> PAK, IPPAK, DPAK, TO-220FP
<b>200V ultrafast rectifiers</b>		
STTHxxx02xx	2x15, 2x30, 2x60, 2x100	ISOTOP, TO-247, TO-220, TO-220 Ins., D <sup>2</sup> PAK
<b>300V ultrafast rectifiers</b>		
STTHxxx03xx STTH xxR03xx	2x30, 2x60, 2x100	ISOTOP, TO-247, D <sup>2</sup> PAK
<b>400V ultrafast rectifiers</b>		
STTHxxxL04xx STTHxxxR04xx	1x30, 1x60, 2x30, 2x60, 2x100	ISOTOP, DO-247, TO-220, TO-220 Ins., D <sup>2</sup> PAK
<b>600V ultrafast rectifiers</b>		
STTHxxxL06xx STTHxxxR06xx	1x30, 2x15, 2x30, 2x60, 2x100	ISOTOP, TO-247, DO-247, TO-220, TO-220 Ins., D <sup>2</sup> PAK
<b>1000V ultrafast rectifiers</b>		
STTHxxx10x	1x12, 1x30, 2x30, 2x60	ISOTOP, DO-247, TO-220 Ins., D <sup>2</sup> PAK
<b>1200V ultrafast rectifiers</b>		
STTHxxx12x	1x12, 1x30, 2x30, 2x60	ISOTOP, DO-247, TO-220 Ins., D <sup>2</sup> PAK

