

Tandem 600 V hyperfast boost diode

Table 1. Main product characteristics

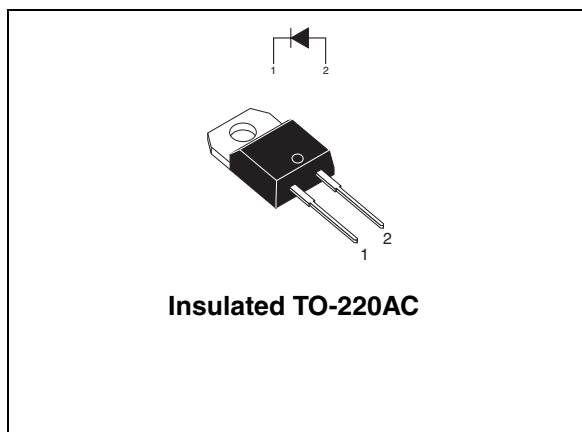
$I_{F(AV)}$	8 A
V_{RRM}	600 V
$T_j (max)$	150° C
$V_F (max)$	2.24 V
$I_{RM} (typ.)$	4 A
$t_{rr} (typ.)$	13 ns

Features and benefits

- Especially suited as boost diode in continuous mode power factor correctors and hard switching conditions
- Designed for high di/dt operation. Hyperfast recovery current to compete with SiC devices. Allows downsizing of mosfet and heatsinks
- Internal ceramic insulated devices with equal thermal conditions for both 300 V diodes
- Insulation (2500 V_{RMS}) allows placement on same heatsink as mosfet and flexible heatsinking on common or separate heatsink
- Static and dynamic equilibrium of internal diodes are warranted by design
- Package Capacitance: C = 7 pF

Table 3. Absolute ratings (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward voltage	14	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10 \text{ ms}$ sinusoidal	180 A
T_{stg}	Storage temperature range	-65 to + 150	° C
T_j	Maximum operating junction temperature	150	° C



Description

The TURBOSWITCH “H” is an ultra high performance diode composed of two 300 V dice in series. TURBOSWITCH “H” family drastically cuts losses in the associated MOSFET when run at high di/dt.

Table 2. Order codes

Part number	Marking
STTH806DTI	STTH806DTI

1 Characteristics

Table 4. Thermal parameter

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case thermal resistance	2.6	°C/W

Table 5. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ \text{C}$	$V_R = V_{RRM}$			10	μA
		$T_j = 125^\circ \text{C}$			15	100	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ \text{C}$	$I_F = 8 \text{ A}$			3.6	V
		$T_j = 150^\circ \text{C}$			1.95	2.4	

1. Pulse test: $t_p = 100 \text{ ms}$, $\delta < 2\%$

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

To evaluate the conduction losses use the following equation:

$$P = 1.7 \times I_{F(AV)} + 0.087 I_{F(RMS)}^2$$

Table 6. Dynamic characteristics

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ \text{C}$	$I_F = 0.5 \text{ A}$, $I_{rr} = 0.25 \text{ A}$, $I_R = 1 \text{ A}$		13		ns
			$I_F = 1 \text{ A}$, $dI_F/dt = -50 \text{ A}/\mu\text{s}$ $V_R = 30 \text{ V}$			30	
I_{RM}	Reverse recovery current	$T_j = 125^\circ \text{C}$	$I_F = 8 \text{ A}$, $V_R = 400$, $V dI_F/dt = -200 \text{ A}/\mu\text{s}$		4	5.5	A
S	Reverse recovery softness factor				0.4		
Q_{rr}	Reverse recovery charges				50		

Table 7. Turn-on switching characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{fr}	Forward recovery time	$T_j = 25^\circ \text{C}$	$I_F = 8 \text{ A}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_F \text{ max}$			200	ns
V_{FP}	Forward recovery voltage	$T_j = 25^\circ \text{C}$	$I_F = 8 \text{ A}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$			7	V

Figure 1. Conduction losses versus average current

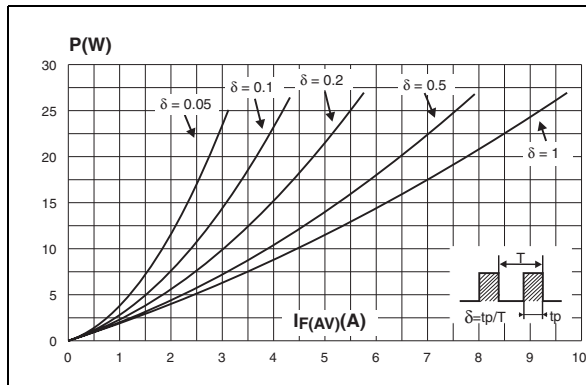


Figure 2. Forward voltage drop versus forward current

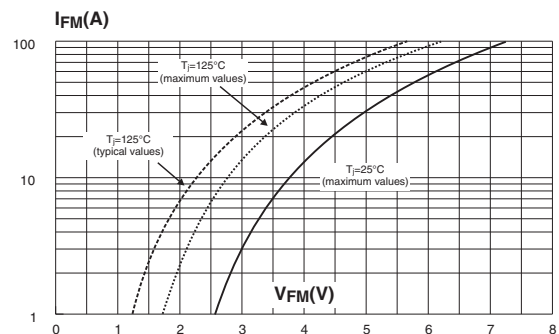


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

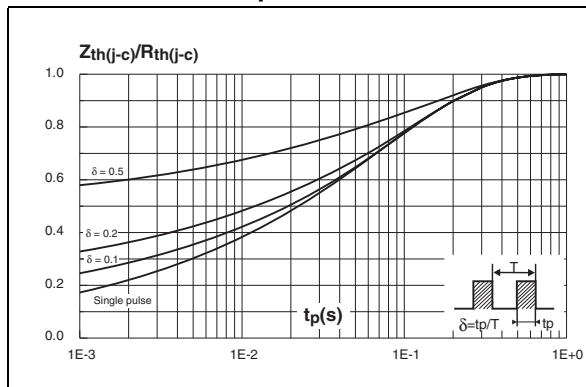
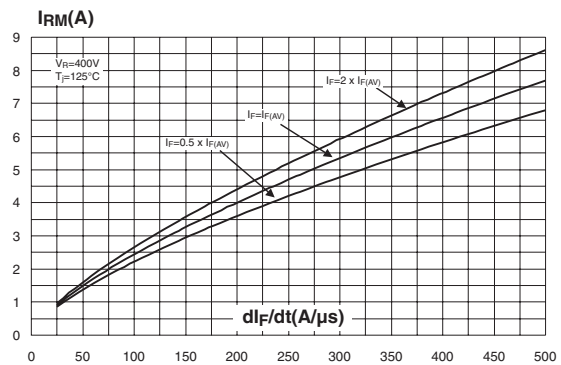
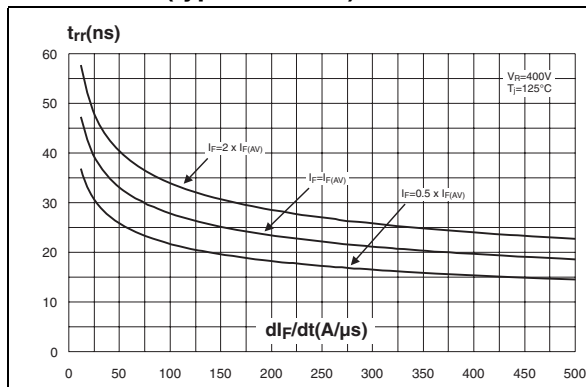
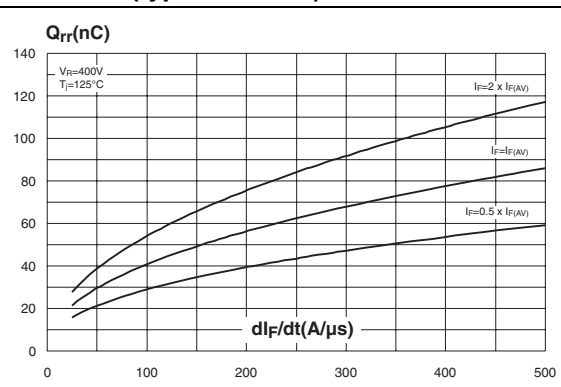
Figure 4. Peak reverse recovery current versus di_F/dt (typical values)Figure 5. Reverse recovery time versus di_F/dt (typical values)Figure 6. Reverse charges versus di_F/dt (typical values)

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

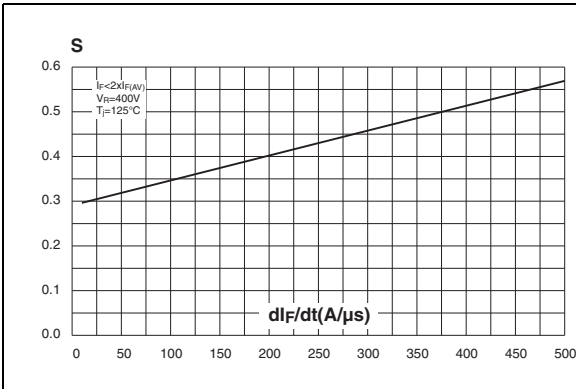


Figure 8. Relative variation of dynamic parameters versus junction temperature (reference: $T_J = 125^\circ C$)

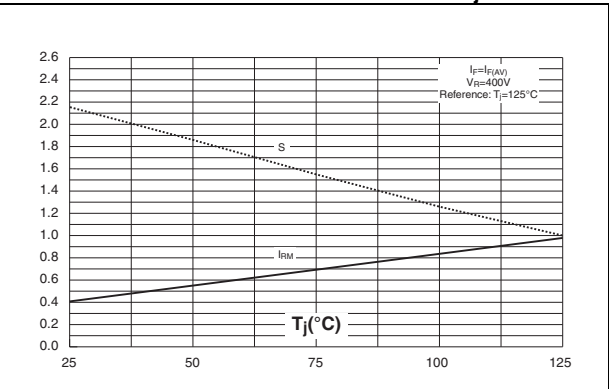


Figure 9. Transient peak forward voltage versus di_F/dt (typical values)

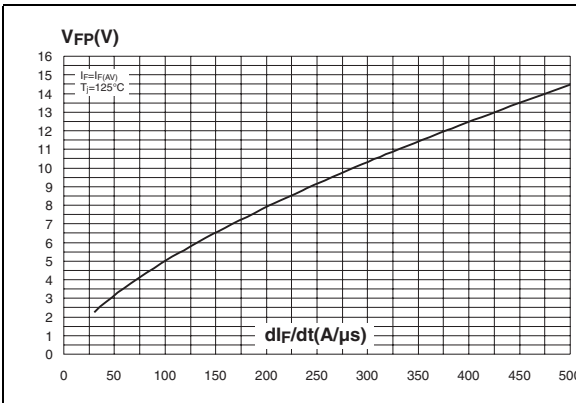
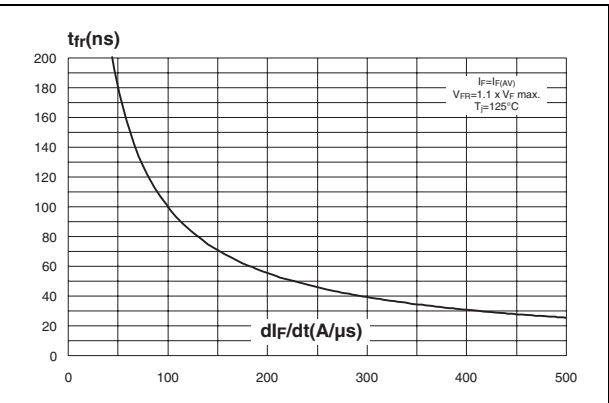


Figure 10. Forward recovery time versus di_F/dt (typical values)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: C
- Recommended torque value: 0.4 to 0.6 Nm

Table 8. TO-220AC insulated dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	4.80		5.40	0.189		0.212
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
M		2.60			0.102	

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.

3 Ordering information

Table 9. Ordering information

Part number	Marking	Package	Weight	Base qty	Delivery mode
STTH806DTI	STTH806DTI	TO-220AC	2.3 g	50	Tube

4 Revision history

Table 10. Revision history

Date	Revision	Changes
Oct-2003	2A	Initial release
May-2004	3	Reformatted
29-Jun-2005	4	Corrections to typographical errors. No technical changes.
11-Jul-2007	5	Reformatted to current standards. Removed I_{PEAK} parameter from Table 3: Absolute ratings (limiting values) .

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