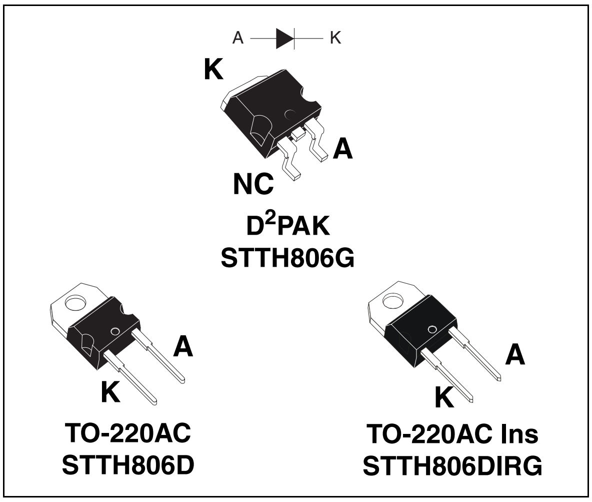
STTH806

Turbo 2 ultrafast - high voltage rectifier

Main product characteristics

$I_{F(AV)}$	8 A
V_{RRM}	600 V
T_j	175° C
V_F (typ)	1.1 V
t_{rr} (max)	35 ns



Features and benefits

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces conduction and switching losses
- Insulated package TO-220AC Ins
  - Insulated voltage: 2500 V_{RMS}
  - Typical package capacitance: 7 pF

Description

The STTH806 uses ST Turbo2 600 V technology. This device is specially suited for use in switching power supplies, and industrial applications.

Order codes

Part Number	Marking
STTH806G	STTH806G
STTH806G-TR	STTH806G
STTH806D	STTH806D
STTH806DIRG	STTH806DI

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			600	V
$I_{F(RMS)}$	RMS forward current		TO-220AC, D^2PAK	30	A
			TO-220 Ins	24	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 140°$ C	TO-220AC, D^2PAK	8	A
		$T_c = 120°$ C	TO-220 Ins	8	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10$ ms Sinusoidal		90	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature(1)			175	°C

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

1 Characteristics

Table 2. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC, D^2PAK	2.5	° C/W
		TO-220AC Ins	4	

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			8	µA
		T_j = 150° C			20	200	
V_F(2)	Forward voltage drop	T_j = 25° C	I_F = 8 A			1.85	V
		T_j = 150° C			1.10	1.40	

1. Pulse test: t_p = 5 ms, $\delta < 2$ %
2. Pulse test: t_p = 380 µs, $\delta < 2$ %

To evaluate the conduction losses use the following equation:
$P = 1.07 \times I_{F(AV)} + 0.041\ I_F{}^2{}_{(RMS)}$

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A, T_j = 25° C			35	ns
		I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V, T_j = 25° C		40	55	
I_{RM}	Reverse recovery current	I_F = 8 A, dI_F/dt = -100 A/µs, V_R = 400 V, T_j = 25° C		4.5	6.5	
t_{fr}	Forward recovery time	I_F = 8 A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}, T_j = 25° C			200	ns
V_{FP}	Forward recovery voltage	I_F = 8 A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}, T_j = 25° C		3.5		V

Figure 1. Conduction losses versus average current

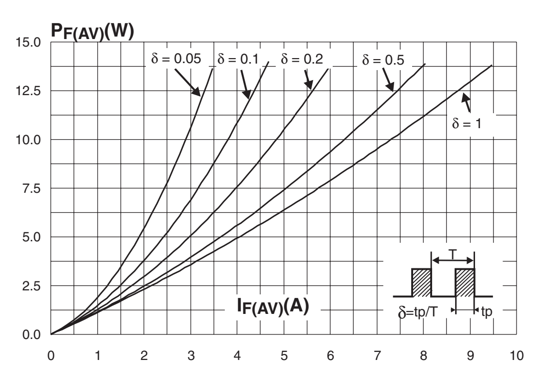


Figure 2. Forward voltage drop versus forward current

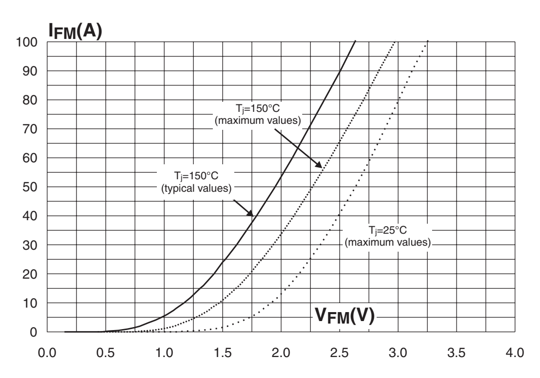


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

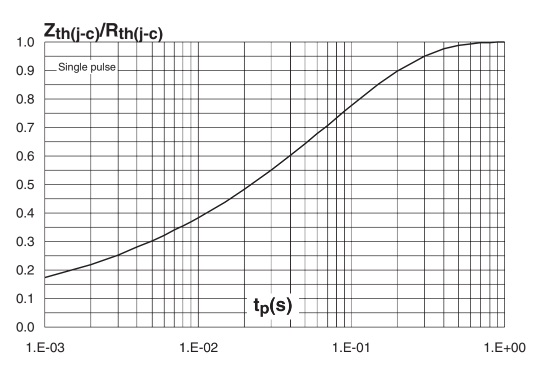


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

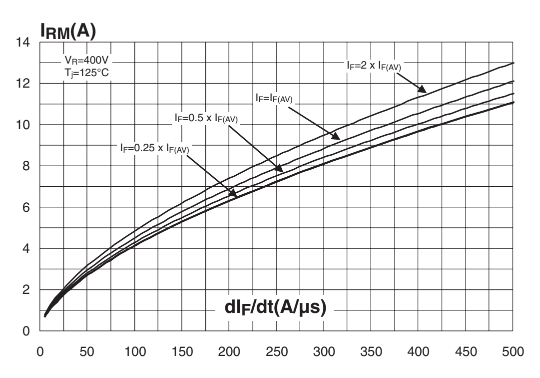


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

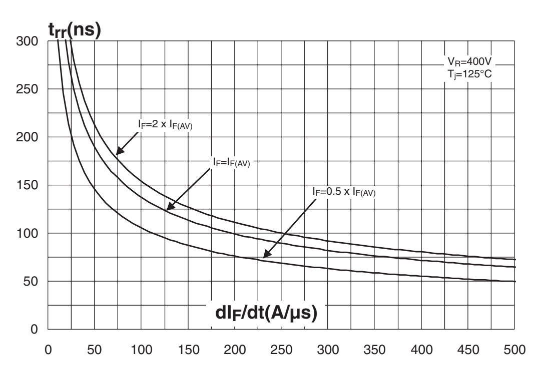


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

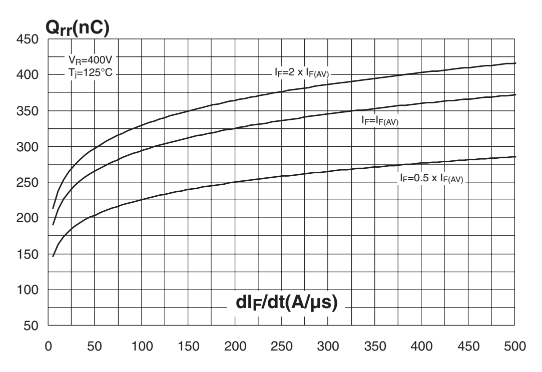


Figure 7. **Softness factor versus dI_F/dt (typical values)**

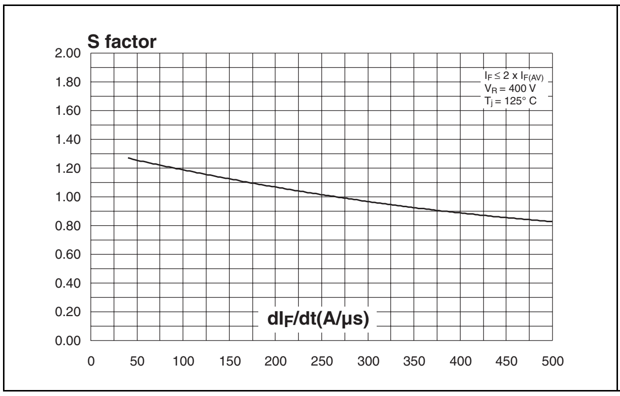


Figure 8. **Relative variations of dynamic parameters versus junction temperature**

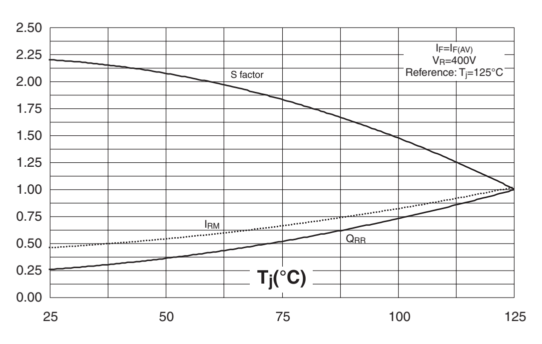


Figure 9. **Transient peak forward voltage versus dI_F/dt (typical values)**

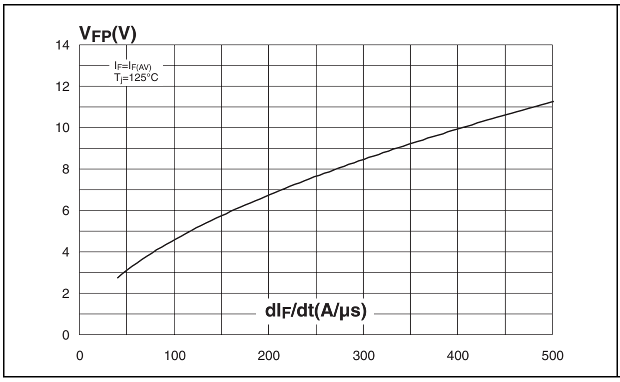


Figure 10. **Forward recovery time versus dI_F/dt (typical values)**

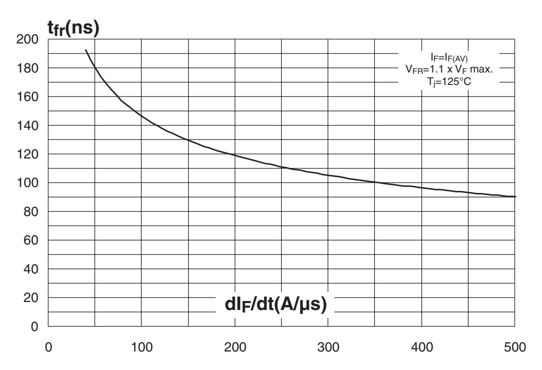


Figure 11. **Junction capacitance versus reverse voltage applied (typical values)**

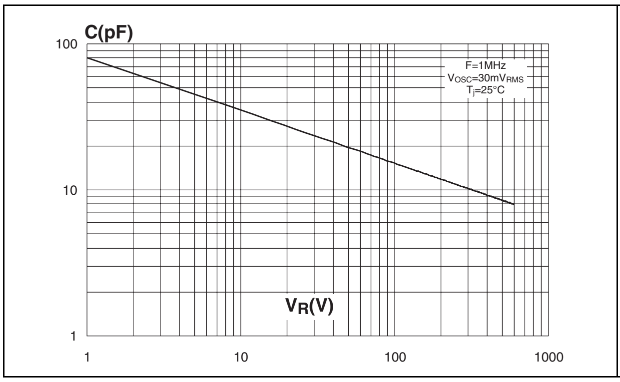
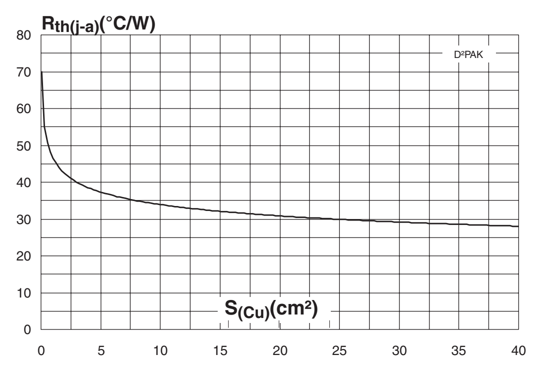


Figure 12. **Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, e_{CU} = 35 µm)**



2 Package mechanical data

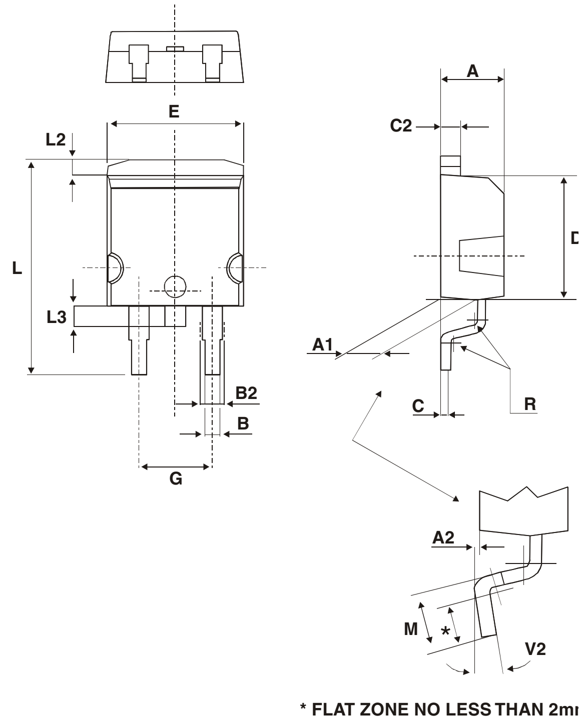
Epoxy meets UL94, V0

Cooling method: by conduction (C)

Recommended torque value: 0.80 Nm

Maximum torque value: 1.0 Nm

Table 5. D^2PAK Dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 13. D^2PAK Footprint dimensions (in mm)

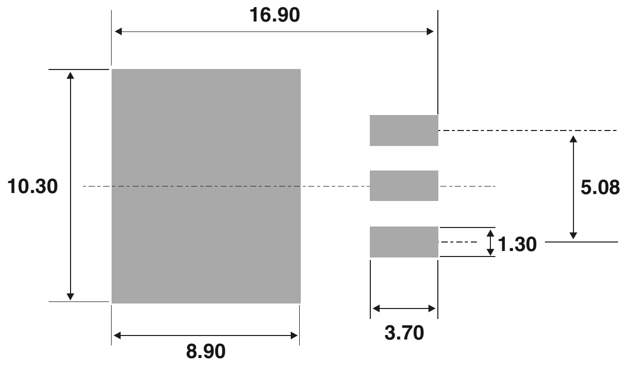
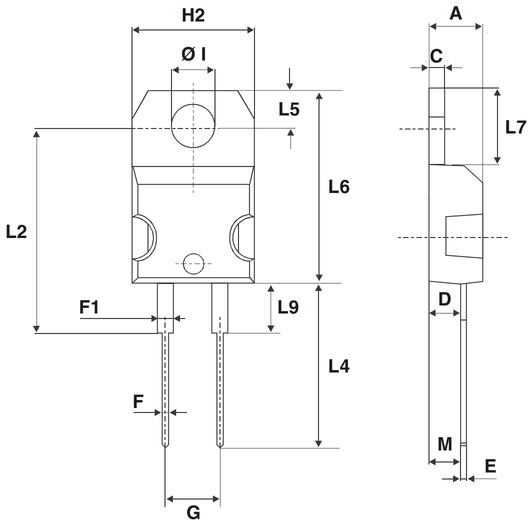
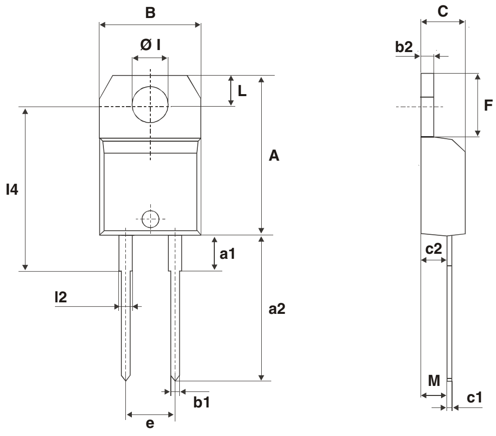


Table 6. TO-220AC Dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

Table 7. TO-220AC Ins 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
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	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

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH806G	STTH806G	D^2PAK	1.48 g	50	Tube
STTH806G-TR	STTH806G	D^2PAK	1.48 g	1000	Tape and reel
STTH806D	STTH806D	TO-220AC	1.90 g	50	Tube
STTH806DIRG	STTH806DI	TO-220AC Ins	2.30 g	50	Tube

4 Revision history

Date	Revision	Description of Changes
18-May-2006	1	First issue.
10-Aug-2006	2	Changed part number STTH806DI to STTH806DIRG.

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