

## Turbo 2 ultrafast high voltage rectifier

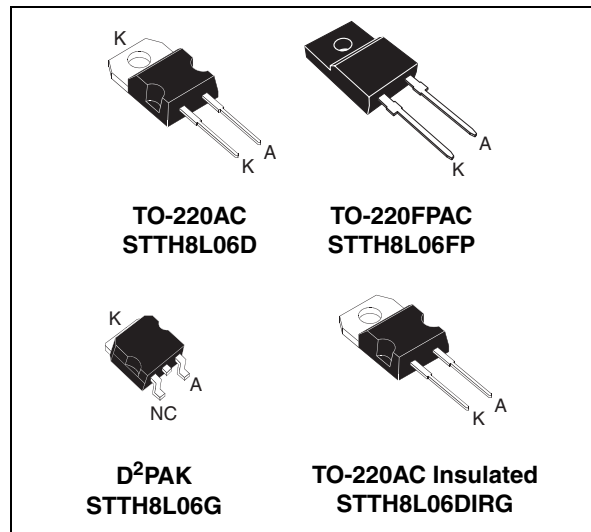
### Features

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching and conduction losses
- Package insulation voltage:
  - TO-220AC Ins: 2500 V rms
  - TO-220FPAC: 2000 V DC

### Description

The STTH8L06, which is using ST Turbo2 600 V technology, is specially suited as boost diode in discontinuous or critical mode power factor corrections.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	8 A
$V_{RRM}$	600 V
$I_R$ (max)	200 $\mu$ A
$T_j$	175 °C
$V_F$ (typ)	0.85 V
$t_{rr}$ (typ)	75 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

Symbol	Parameter		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage		600	V	
I <sub>F(RMS)</sub>	Forward rms current	TO-220AC / TO-220FPAC / D <sup>2</sup> PAK	30	A	
		TO-220AC Ins.	24		
I <sub>F(AV)</sub>	Average forward current δ = 0.5	TO-220AC / D <sup>2</sup> PAK	8	A	
		TO-220FPAC			T <sub>c</sub> = 150 °C
		TO-220AC Ins.			T <sub>c</sub> = 125 °C
I <sub>FSM</sub>	Surge non repetitive forward current		t <sub>p</sub> = 10 ms sinusoidal	120	A
T <sub>stg</sub>	Storage temperature range		-65 to 175	°C	
T <sub>j</sub>	Operating junction temperature range		-40 to 175	°C	

**Table 3. Thermal resistance**

Symbol	Parameter		Value (max)	Unit
R <sub>th(j-c)</sub>	Junction to case	TO-220AC / D <sup>2</sup> PAK	2.5	°C/W
		TO-220FPAC	5	
		TO-220AC Ins.	4	

**Table 4. Static electrical characteristics**

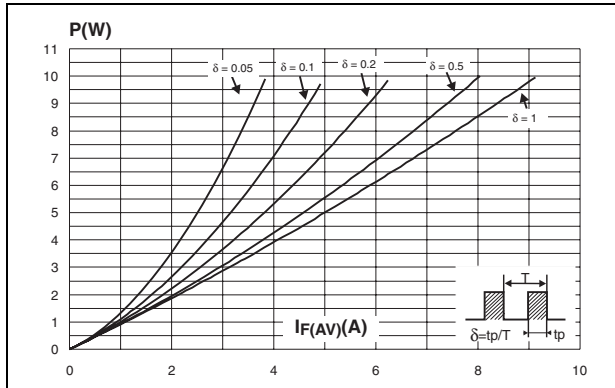
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>			8	μA
		T <sub>j</sub> = 150 °C			16	200	
V <sub>F</sub>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 8 A			1.3	V
		T <sub>j</sub> = 150 °C			0.85	1.05	

To evaluate the conduction losses use the following equation:  $P = 0.89 \times I_{F(AV)} + 0.022 I_{F(RMS)}^2$

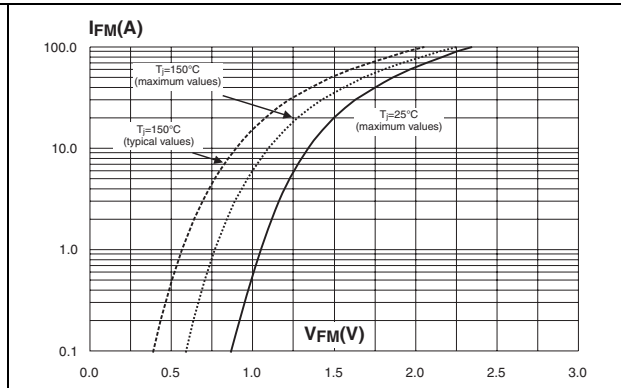
**Table 5. Dynamic characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t <sub>rr</sub>	Reverse recovery time	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 1 A, di <sub>F</sub> /dt = -50 A/μs V <sub>R</sub> = 30 V		75	105	ns
I <sub>RM</sub>	Reverse recovery current	T <sub>j</sub> = 125 °C	I <sub>F</sub> = 8 A, di <sub>F</sub> /dt = 100 A/μs, V <sub>R</sub> = 400 V		7.2	10	A
t <sub>fr</sub>	Forward recovery time	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 8 A, di <sub>F</sub> /dt = 100 A/μs V <sub>FR</sub> = 1.1 x V <sub>Fmax</sub>			150	ns
V <sub>FP</sub>	Forward recovery voltage		I <sub>F</sub> = 8 A, di <sub>F</sub> /dt = 100 A/μs			6	V

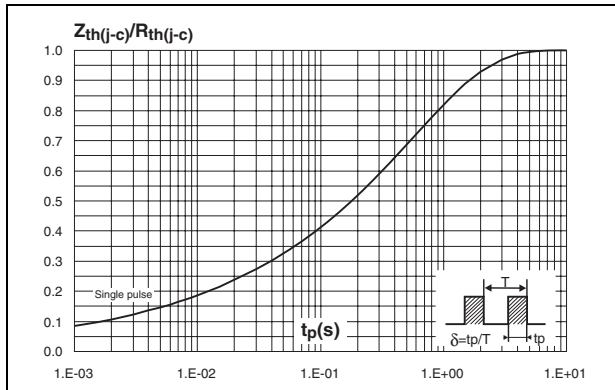
**Figure 1. Conduction losses versus average current**



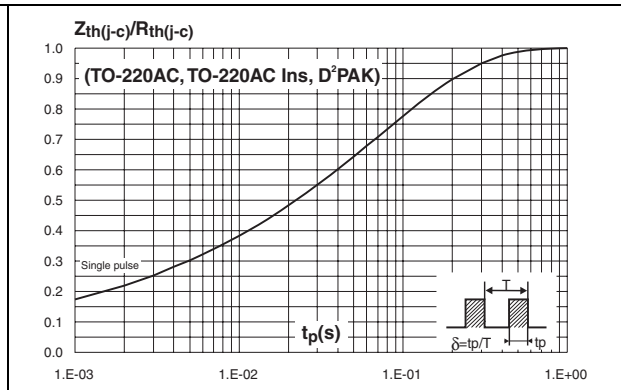
**Figure 2. Forward voltage drop versus forward current**



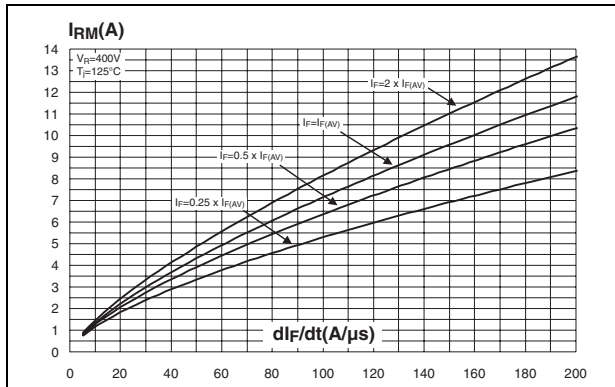
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)**



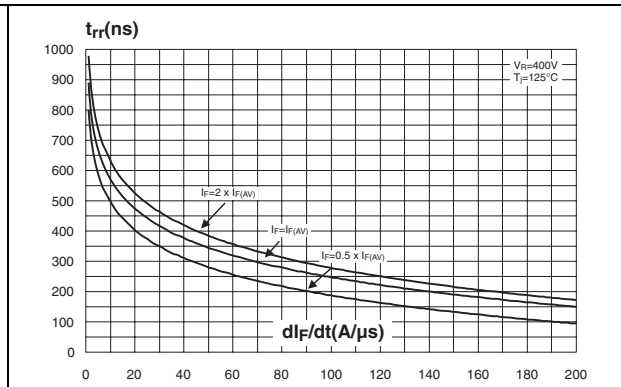
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, TO-220AC Ins, D<sup>2</sup>PAK)**



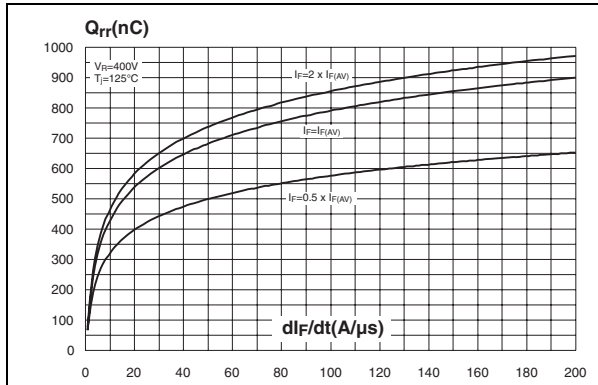
**Figure 5. Peak reverse recovery current versus di\_F/dt (typical values)**



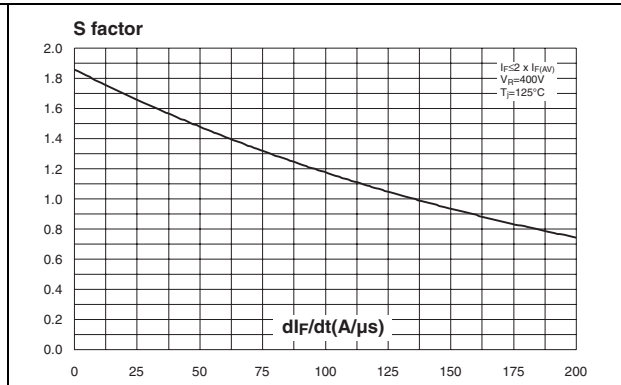
**Figure 6. Reverse recovery time versus di\_F/dt (typical values)**



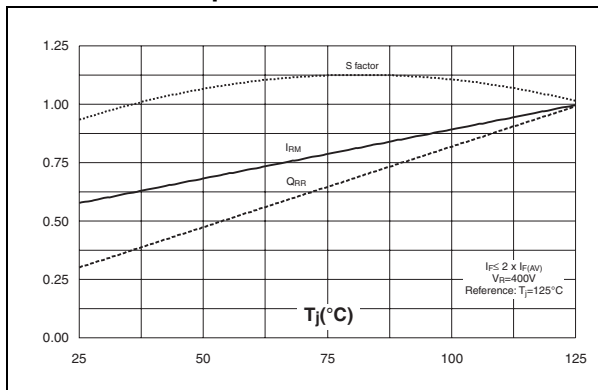
**Figure 7. Reverse recovery charges versus  $di_F/dt$  (typical values)**



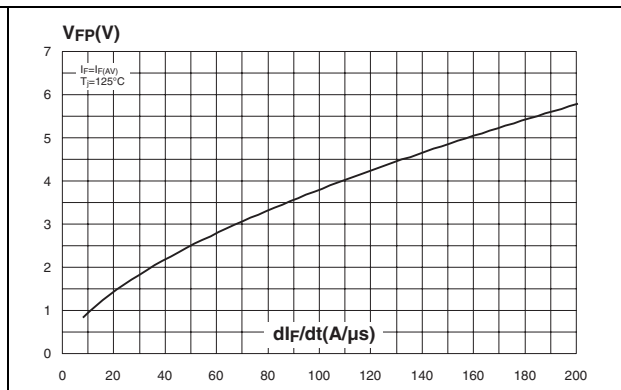
**Figure 8. Softness factor versus  $di_F/dt$  (typical values)**



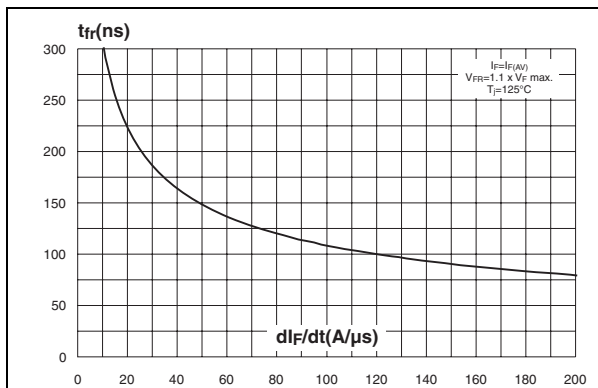
**Figure 9. Relative variations of dynamic parameters versus junction temperature**



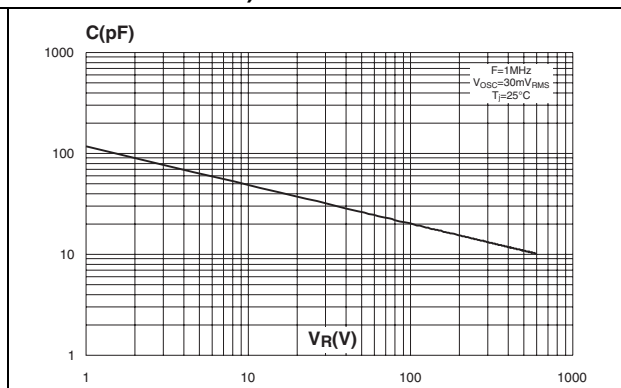
**Figure 10. Transient peak forward voltage versus  $di_F/dt$  (typical values)**

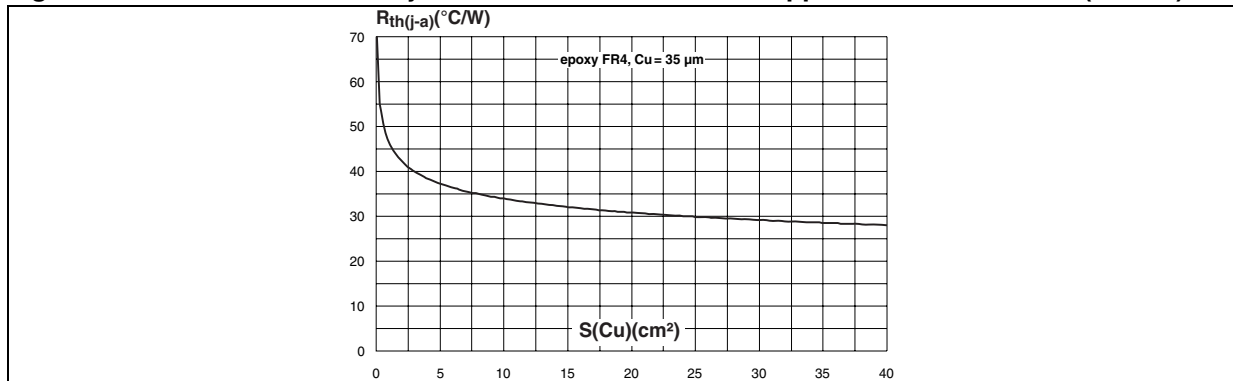


**Figure 11. Forward recovery time versus  $di_F/dt$  (typical values)**



**Figure 12. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 13. Thermal resistance junction to ambient versus copper surface under tab (D<sup>2</sup>PAK)**

## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 N·m to 0.6 N·m

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**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

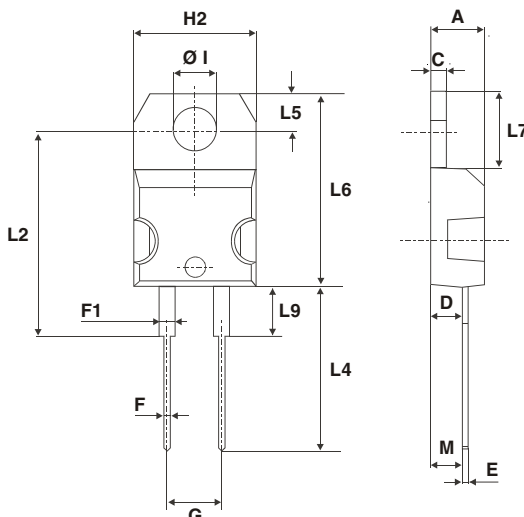
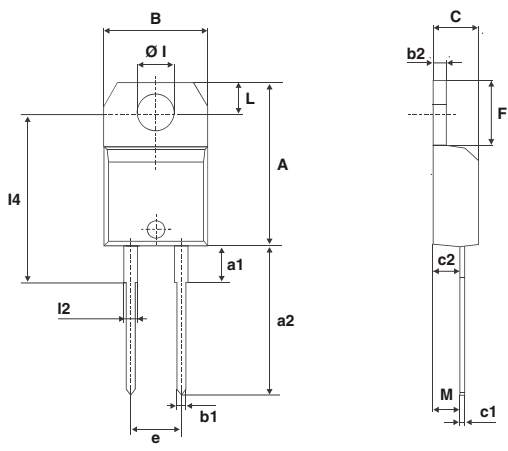


Table 7. TO-220FPAC dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 8. TO-220AC (Nins. & Ins. 20-up) dimensions



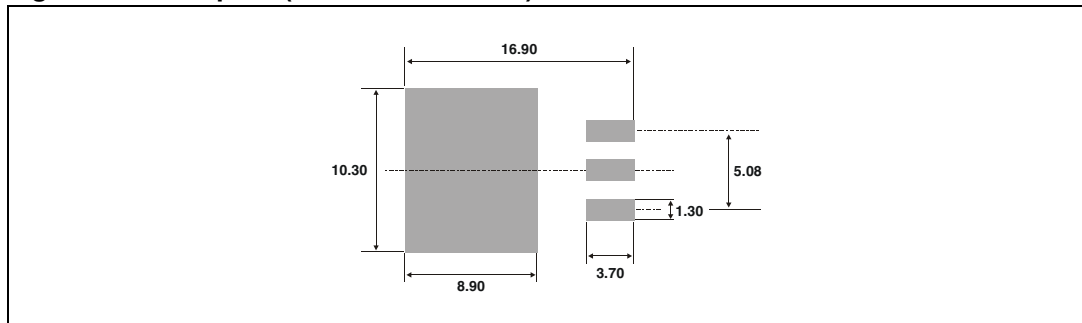
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		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	



Table 9. D<sup>2</sup>PAK 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 14. Footprint (dimensions in mm)



### 3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH8L06D	STTH8L06D	TO-220AC	1.90 g	50	Tube
STTH8L06G	STTH8L06G	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH8L066G-TR	STTH8L06G	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel
STTH8L06FP	STTH8L06FP	TO-220FPAC	1.70 g	50	Tube
STTH8L06DIRG	STTH8L06DI	TO-220AC Ins.	1.86 g	50	Tube

### 4 Revision history

Table 11. Document revision history

Date	Revision	Changes
Nov-2002	2A	Last issue
18-Oct-2004	3	TO-220AC Insulated and D <sup>2</sup> PAK packages added
13-Jun-2005	4	T <sub>j</sub> changed from value 175 to range -40 to 175 °C - Page1
10-Aug-2006	5	Reformatted to current standard. Added package insulation voltage data on page 1. Changed order code STTH8L06DI to STTH8L06DIRG.
07-Feb-2012	6	Added I <sub>RM</sub> to <a href="#">Table 4</a> .

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