STTH16L06C

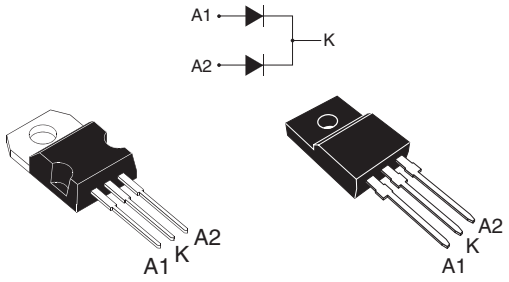
Turbo 2 ultrafast high voltage rectifier

Features

- Ultrafast switching
- Low reverse recovery current
- Reduces switching and conduction losses
- Low thermal resistance

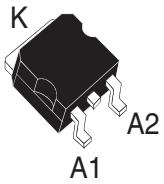
Description

The STTH16L06, which is using ST Turbo 2 600 V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.



TO-220AB
STTH16L06CT

TO-220FPAB
STTH16L06CFP



D²PAK
STTH16L06CG

Table 1. Device summary

$I_{F(AV)}$	Up to 2 x 10 A
V_{RRM}	600 V
T_j	175 °C
V_F (typ)	1.05 V
t_{rr} (max)	35 ns

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				600	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / D^2PAK	T_c = 140 °C	Per diode	8	A
			T_c = 135 °C	Per device	16	
			T_c = 130 °C	Per diode	10	
			T_c = 120 °C	Per device	20	
		TO-220FPAB	T_c = 110 °C	Per diode	8	
			T_c = 80 °C	Per device	16	
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal		120	A
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature				175	°C

Table 3. Thermal resistance

Symbol	Parameter			Maximum	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB / D^2PAK	Per diode	2.5	°C/W
		TO-220FPAB	Per diode	5	
		TO-220AB / D^2PAK	Total	1.6	
		TO-220FPAB	Total	3.8	
$R_{th(c)}$	Coupling	TO-220AB / D^2PAK		0.7	°C/W
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)\ (per\ diode)} + P_{(diode2)} \times R_{th(c)}$

Table 4. 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			25	240	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 8 A			1.8	V
		T_j = 150 °C			1.05	1.35	
		T_j = 25 °C	I_F = 16 A			2.08	
		T_j = 150 °C			1.28	1.64	

1. Pulse test: t_p = 5 ms, δ < 2 %
2. Pulse test: t_p = 380 µs, δ < 2 %

To evaluate the maximum conduction losses use the following equation:
$P = 1.06 \times I_{F(AV)} + 0.036\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A			35	ns
			I_F = 1 A, dI_F/dt = 50 A/µs, V_R = 30 V		40	55	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 8 A, dI_F/dt = 100 A/µs, V_R = 400 V		4.5	6.5	A
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 8 A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}			200	ns
V_{FP}	Forward recovery voltage				3.5		V

Figure 1. Conduction losses versus average current

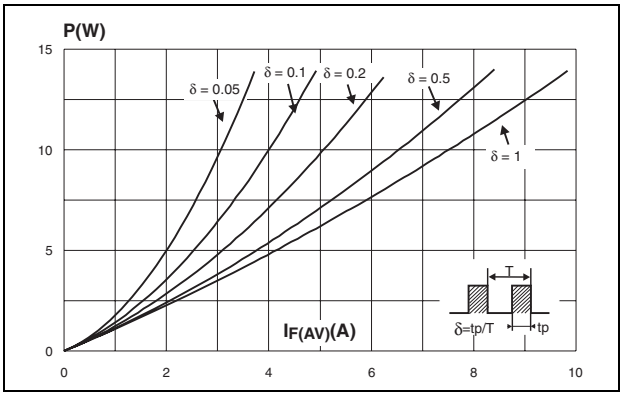


Figure 2. Forward voltage drop versus forward current

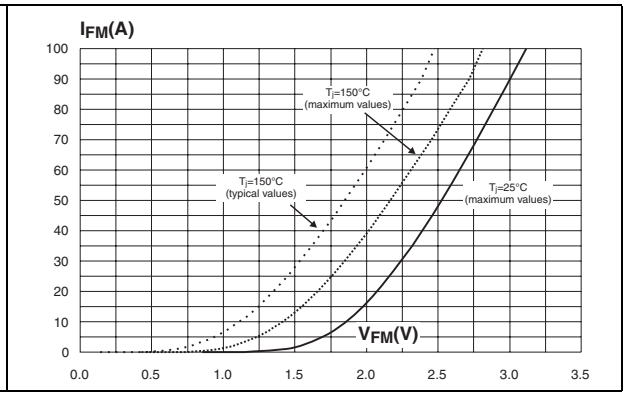


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK)

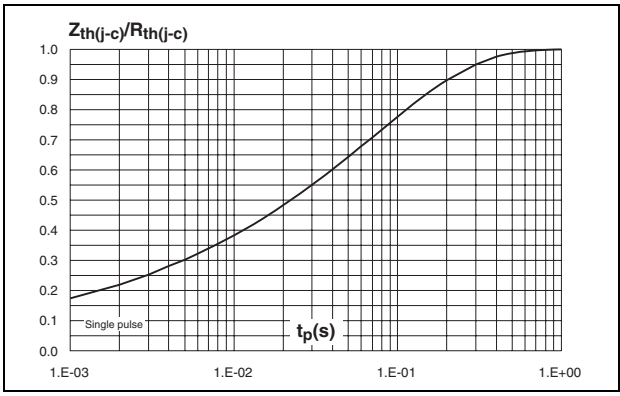


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

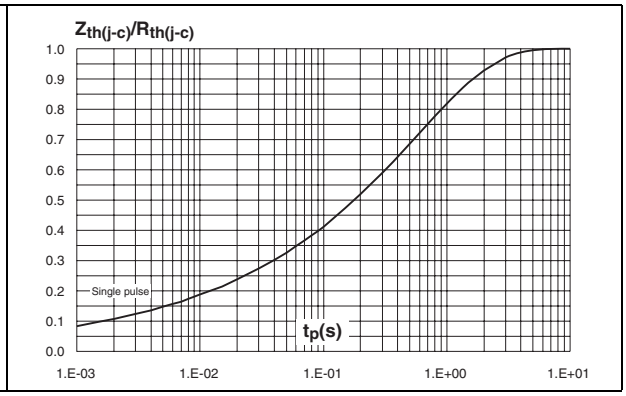


Figure 5. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

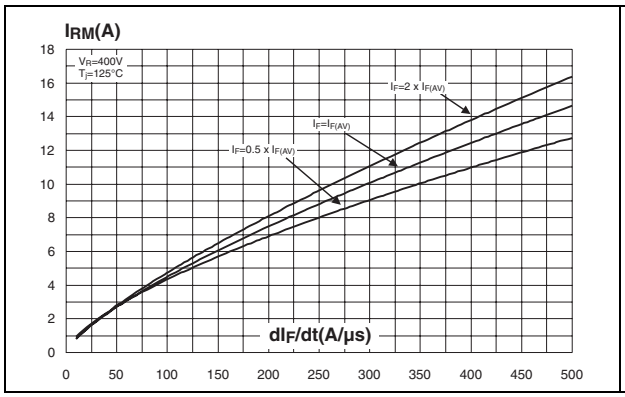


Figure 6. Reverse recovery time versus dI_F/dt (typical values, per diode)

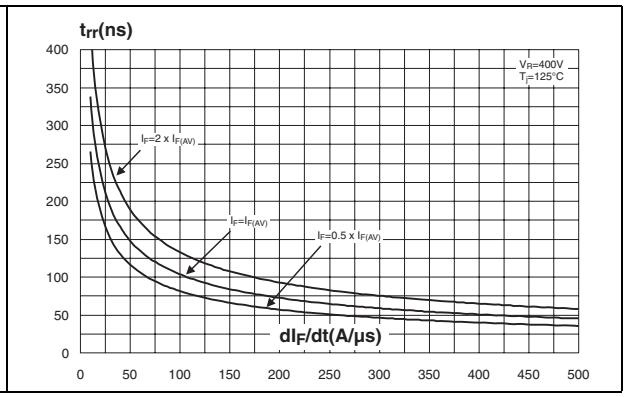


Figure 7. Reverse recovery charges versus dI_F/dt (typical values, per diode)

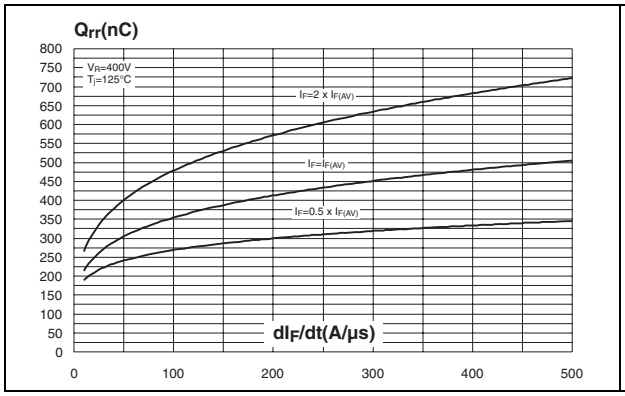


Figure 8. Reverse recovery softness factor versus dI_F/dt (typical values, per diode)

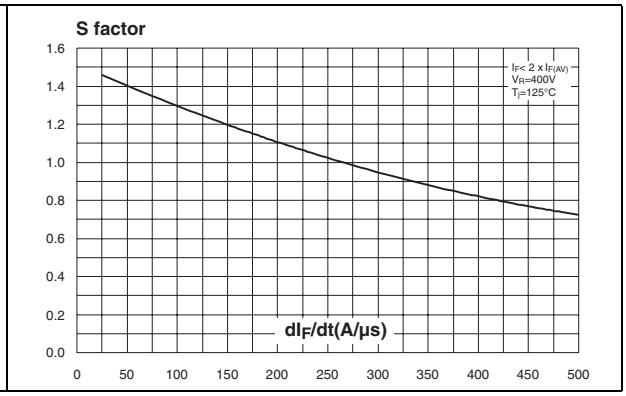


Figure 9. Relative variations of dynamic parameters versus junction temperature

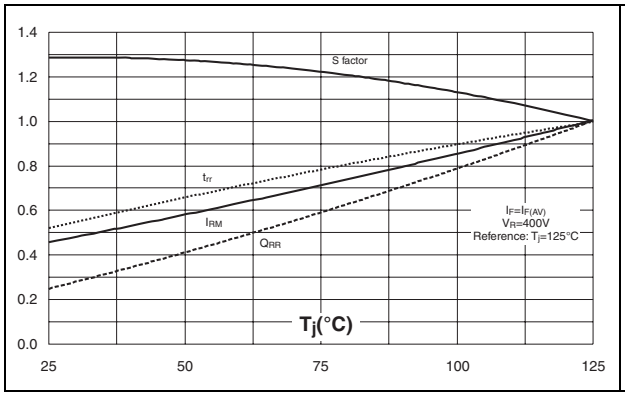


Figure 10. Transient peak forward voltage versus dI_F/dt (typical values, per diode)

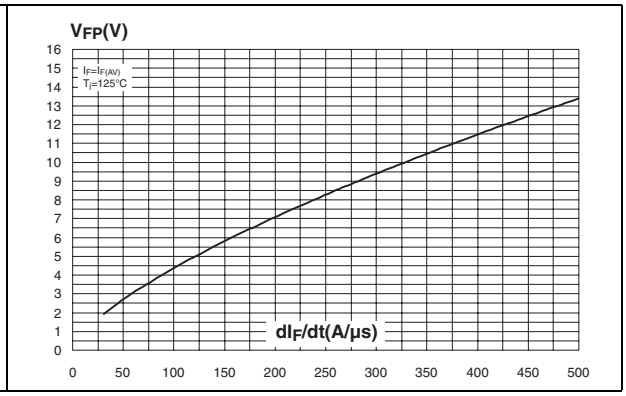


Figure 11. Forward recovery time versus dI_F/dt (typical values, per diode)

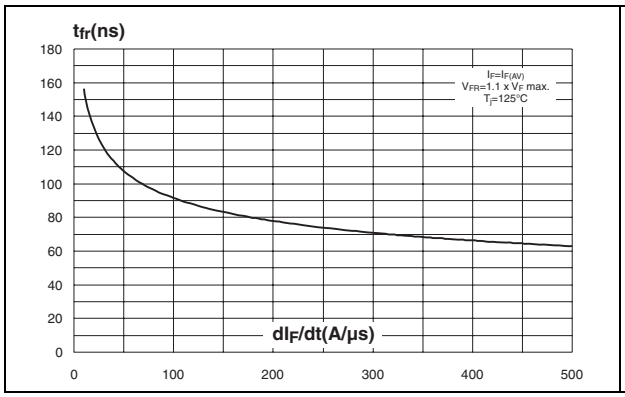


Figure 12. Junction capacitance versus reverse voltage applied (typical values, per diode)

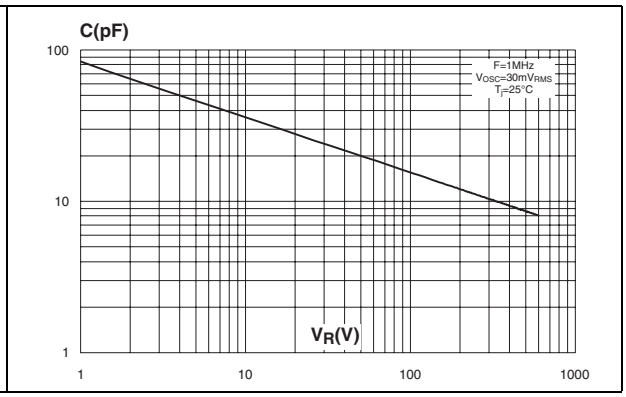
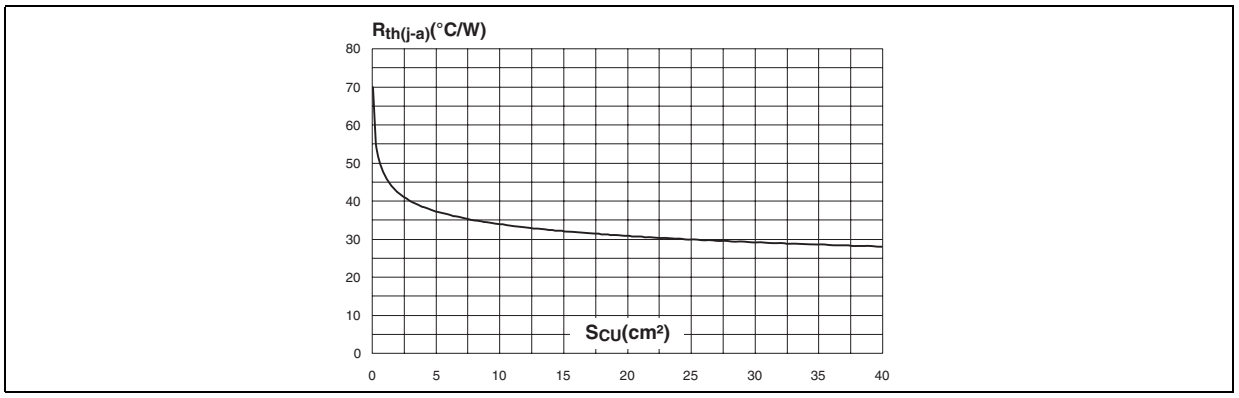


Figure 13. Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, copper thickness = 35 µm) (D^2PAK)



2 Package mechanical data

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

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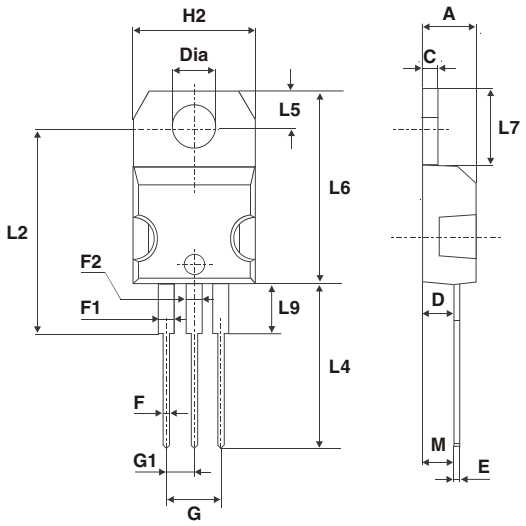
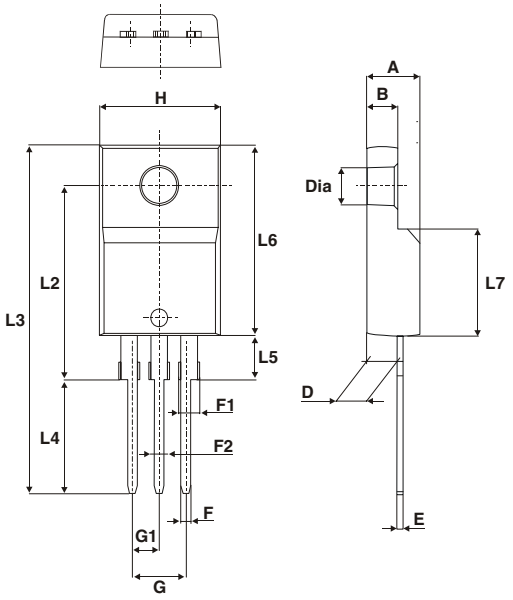
Table 6. TO-220AB dimensions



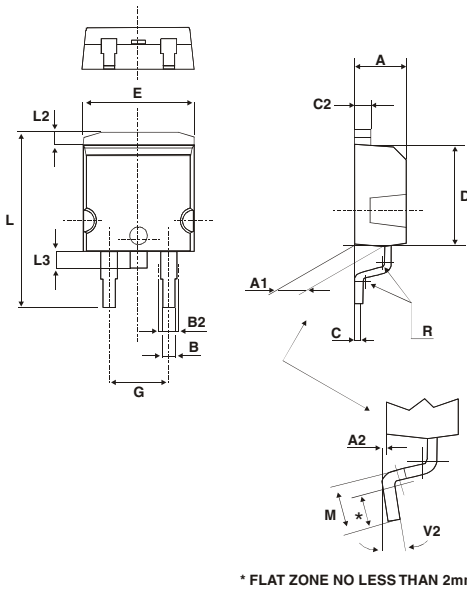
Ref.	dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	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.	3.75	3.85	0.147	0.151

Table 7. TO-220FPAB dimensions



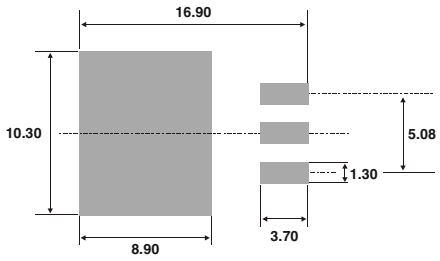
Ref.	dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		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. D²PAK 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 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH16L06CT	STTH16L06CT	TO-220AB	2.23 g	50	Tube
STTH16L06CG	STTH16L06CG	D^2PAK	1.48 g	50	Tube
STTH16L06CG-TR	STTH16L06CG	D^2PAK	1.48 g	1000	Tape and reel
STTH16L06CFP	STTH16L06CFP	TO-220FPAB	1.70 g	50	Tube

4 Revision history

Table 10. Document revision history

Date	Revision	Description of Changes
07-Sep-2004	1	First issue
07-Apr-2011	2	Updated ECOPACK statement.

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