

TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

Table 1: Main Product Characteristics

$I_{F(AV)}$	Up to 20 A
V_{RRM}	600 V
T_j	175°C
V_F (typ)	0.95 V
t_{rr} (max)	55 ns

FEATURES AND BENEFITS

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching & conduction losses

DESCRIPTION

The STTH15L06, which is using ST Turbo 2 600V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.

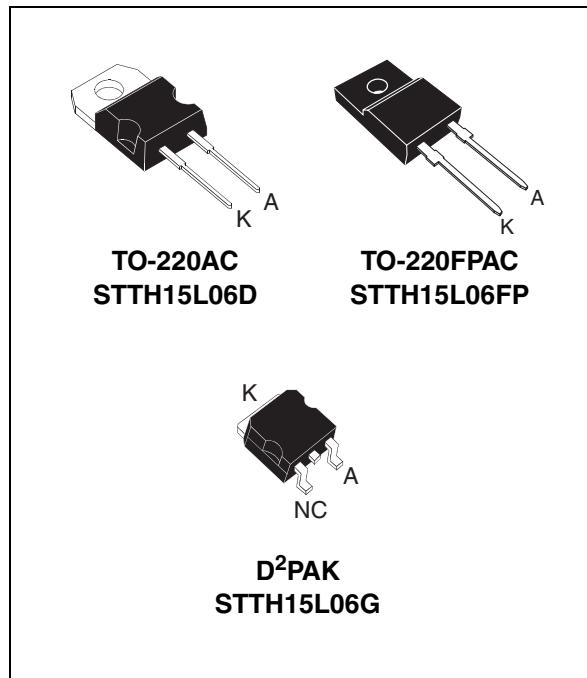


Table 2: Order Codes

Part Number	Marking
STTH15L06D	STTH15L06D
STTH15L06G	STTH15L06G
STTH15L06G-TR	STTH15L06G
STTH15L06FP	STTH15L06FP

Table 3: Absolute Ratings (limiting values)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			600	V
$I_{F(RMS)}$	RMS forward voltage			30	A
$I_{F(AV)}$	Average forward current	TO-220AC /	$T_c = 140^\circ\text{C}$ $\delta = 0.5$	15	A
		D²PAK	$T_c = 120^\circ\text{C}$ $\delta = 0.5$	20	
	TO-220FPAC		$T_c = 90^\circ\text{C}$ $\delta = 0.5$	15	
I_{FSM}	Surge non repetitive forward current			130	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature			175	°C

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Table 4: Thermal Resistance

Symbol	Parameter		Value (max.)	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC / D ² PAK	1.7	°C/W
		TO-220FPAC	4	

Table 5: Static Electrical Characteristics (per diode)

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
I_R *	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$		15	μA
		$T_j = 150^\circ\text{C}$		40	400	
V_F **	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$		1.55	V
		$T_j = 150^\circ\text{C}$			0.95	

Pulse test: * $t_p = 5 \text{ ms}, \delta < 2\%$

** $t_p = 380 \mu\text{s}, \delta < 2\%$

To evaluate the conduction losses use the following equation: $P = 0.94 \times I_F(\text{AV}) + 0.017 I_F^2 \text{ (RMS)}$

Table 6: Dynamic Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{A}$	$I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$		55	ns
			$I_F = 1\text{A}$		$dI_F/dt = 50 \text{ A}/\mu\text{s}$	60	
I_{RM}	Reverse recovery current	$T_j = 125^\circ\text{C}$	$I_F = 15\text{A}$	$V_R = 400\text{V}$		8.5	12
t_{fr}	Forward recovery time	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$	$dI_F/dt = 100 \text{ A}/\mu\text{s}$		300	ns
V_{FP}	Forward recovery voltage	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$	$V_{FR} = 1.1 \times V_{Fmax}$		3	

Figure 1: Conduction losses versus average forward current

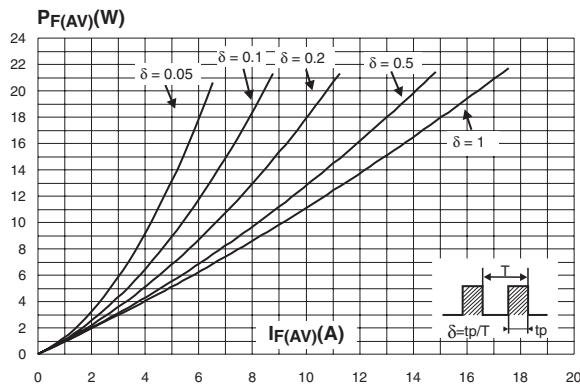


Figure 2: Forward voltage drop versus forward current

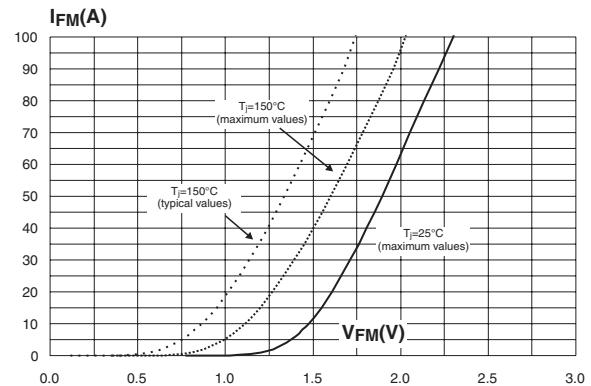


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC & D²PAK)

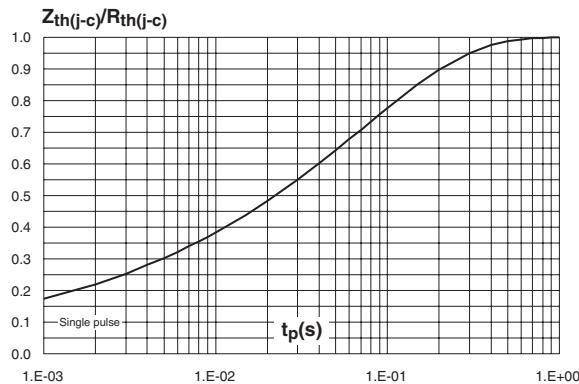


Figure 5: Peak reverse recovery current versus dI_F/dt (typical values)

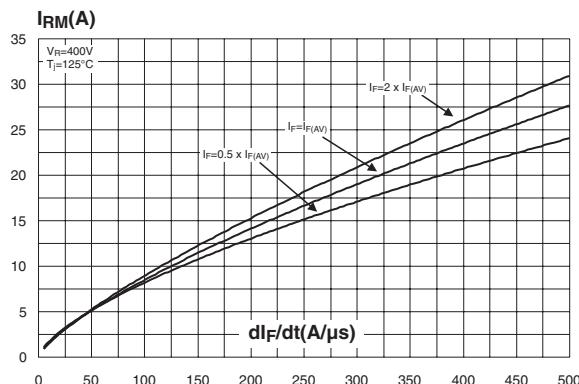


Figure 7: Reverse recovery charges versus dI_F/dt (typical values)

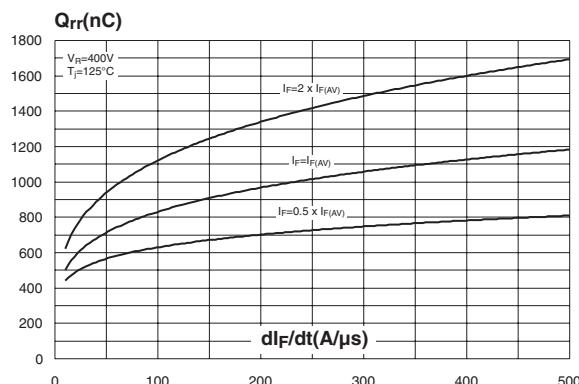


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

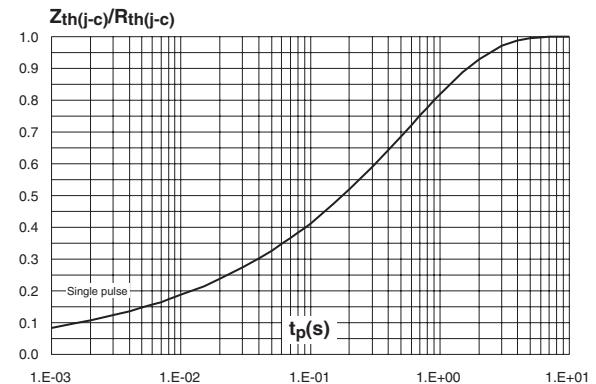


Figure 6: Reverse recovery time versus dI_F/dt (typical values)

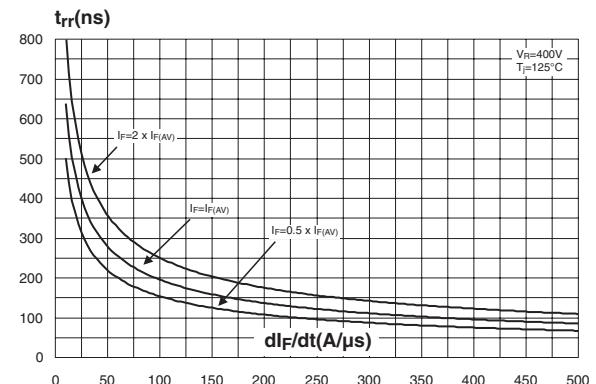


Figure 8: Reverse recovery softness factor versus dI_F/dt (typical values)

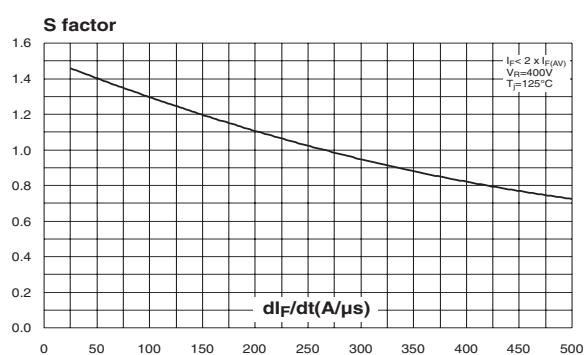


Figure 9: Relative variations of dynamic parameters versus junction temperature

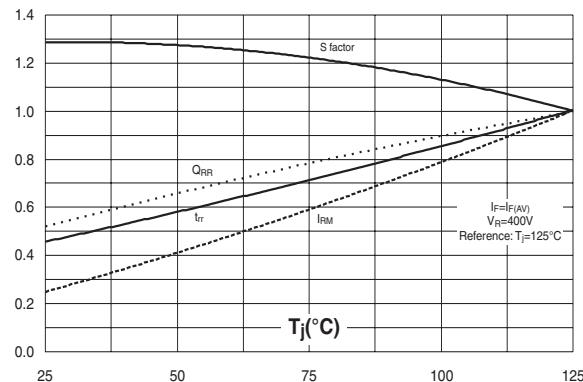


Figure 11: Forward recovery time versus dI_F/dt (typical values)

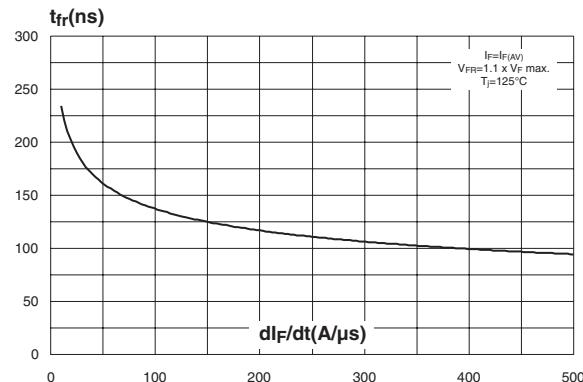


Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, $e_{CU}=35\mu m$) (D²PAK)

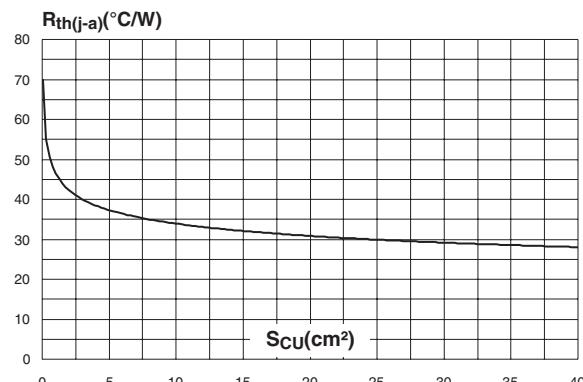


Figure 10: Transient peak forward voltage versus dI_F/dt (typical values)

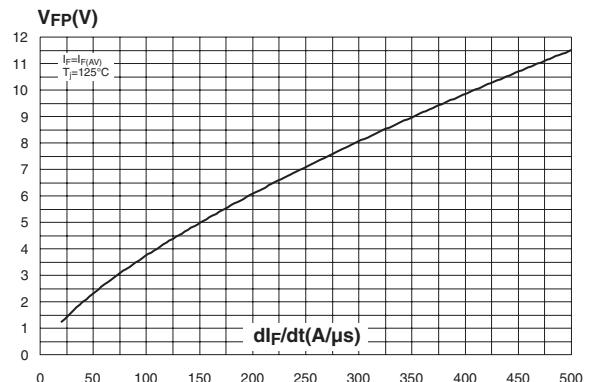


Figure 12: Junction capacitance versus reverse voltage applied (typical values)

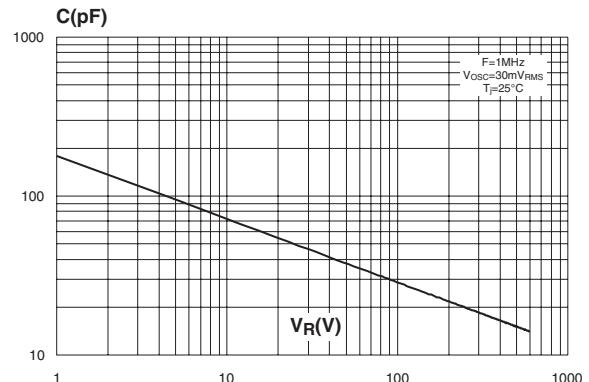
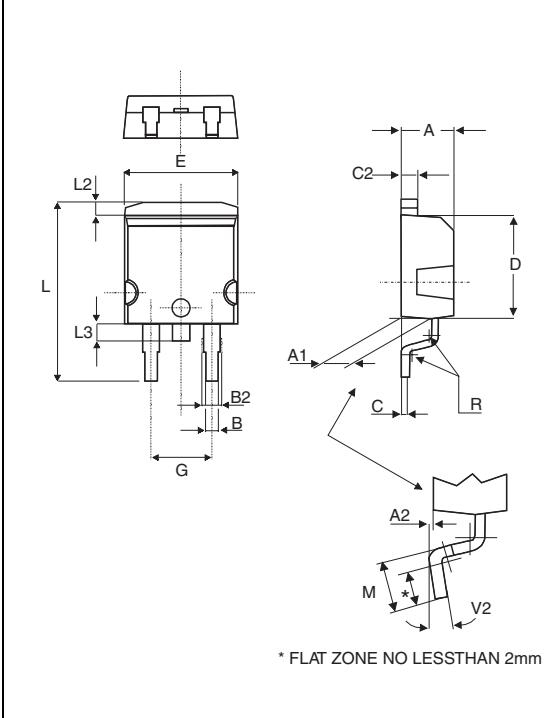
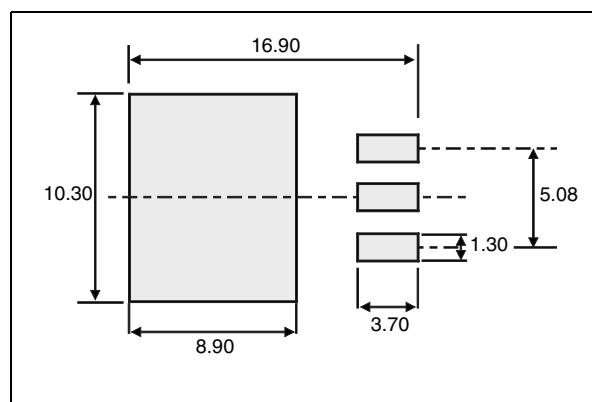


Figure 14: D²PAK Package Mechanical Data


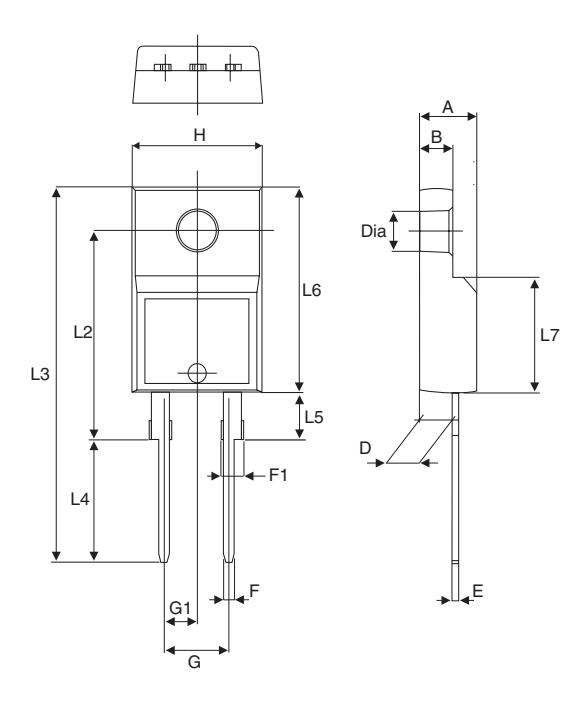
The figure contains three views of a D²PAK package. The top view shows dimensions L, E, L₂, L₃, G, B₂, B, and A. The side view shows dimensions A, C₂, D, A₁, C, R, A₂, M, and V₂. A callout at the bottom right specifies: * FLAT ZONE NO LESS THAN 2mm.

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
L ₂	1.27	1.40	0.050	0.055
L ₃	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V ₂	0°	8°	0°	8°

Figure 15: D²PAK Foot Print Dimensions
(in millimeters)

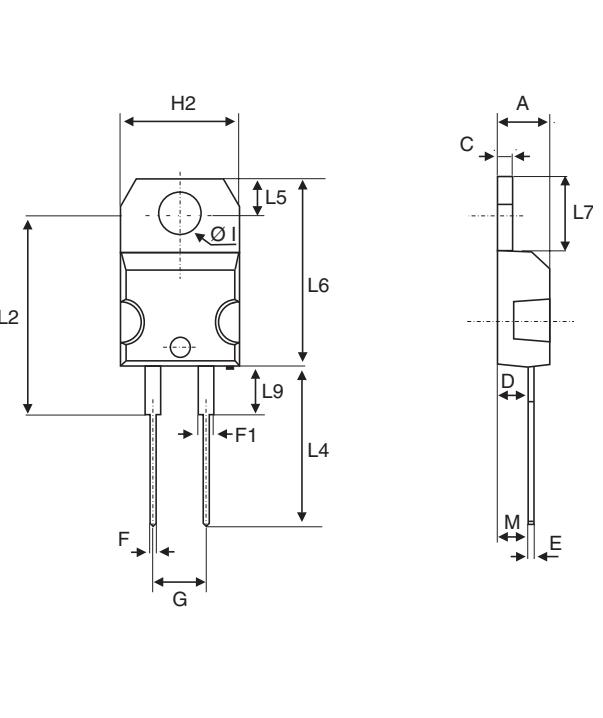
STTH15L06

Figure 16: TO-220FPAC Package Mechanical Data



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	0.017	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	0.204
G1	2.40	2.70	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	1.204
L4	9.8	10.6	0.385	0.417
L6	15.9	16.4	0.626	0.645
L7	9.00	9.30	0.354	0.366
Dia.	3	3.20	0.118	0.126

Figure 17: TO-220AC Package Mechanical Data



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: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH15L06D	STTH15L06D	TO-220AC	1.90 g	50	Tube
STTH15L06G	STTH15L06G	D ² PAK	1.48 g	50	Tube
STTH15L06G-TR	STTH15L06G	D ² PAK	1.48 g	1000	Tape & reel
STTH15L06FP	STTH15L06FP	TO-220FPAC	1.70 g	50	Tube

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N. (TO-220FPAC) / 0.55 m.N. (TO-220AC)
- Maximum torque value: 1.0 m.N. (TO-220FPAC) / 0.70 m.N. (TO-220AC)

Table 8: Revision History

Date	Revision	Description of Changes
07-Sep-2004	1	First issue

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