

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

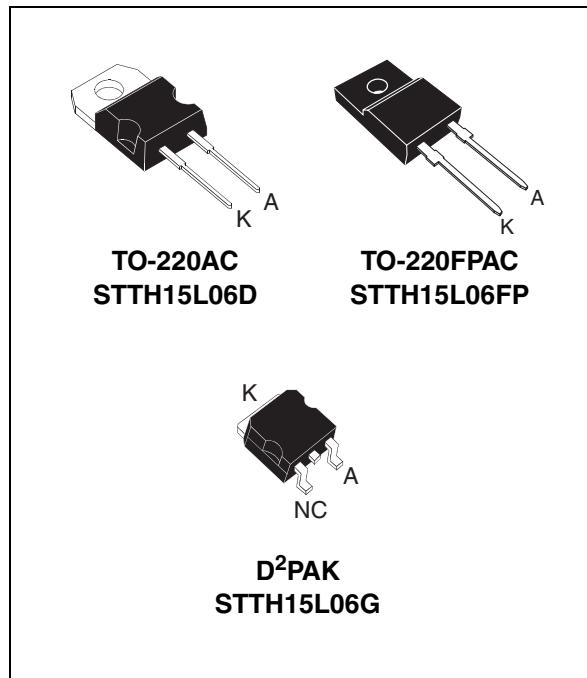
$I_{F(AV)}$	Up to 20 A
$V_{RRM}$	600 V
$T_j$	175°C
$V_F$ (typ)	0.95 V
$t_{rr}$ (max)	55 ns

### 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 /	$T_c = 140^\circ\text{C}$	15	A
		D²PAK	$T_c = 120^\circ\text{C}$	20	
	TO-220FPAC		$T_c = 90^\circ\text{C}$	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 <sup>2</sup> 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: \*  $t_p = 5 \text{ ms}, \delta < 2\%$

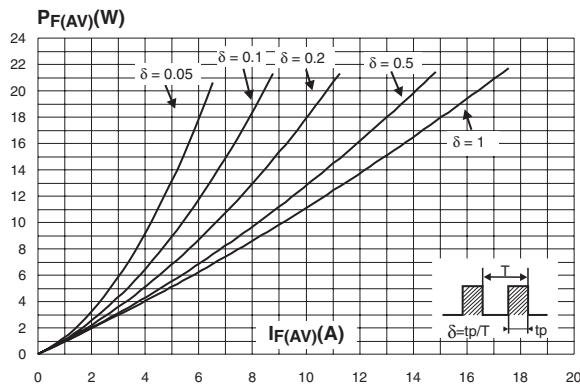
\*\*  $t_p = 380 \mu\text{s}, \delta < 2\%$

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

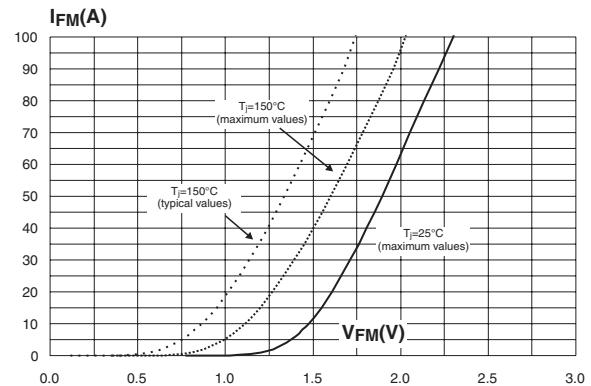
**Table 6: Dynamic Characteristics**

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
			$I_F = 1\text{A}$	$dI_F/dt = 50 \text{ A}/\mu\text{s}$	$V_R = 30\text{V}$		
$I_{RM}$	Reverse recovery current	$T_j = 125^\circ\text{C}$	$I_F = 15\text{A}$	$V_R = 400\text{V}$	$dI_F/dt = 100 \text{ A}/\mu\text{s}$		8.5 A
$t_{fr}$	Forward recovery time	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$	$dI_F/dt = 100 \text{ A}/\mu\text{s}$	$V_{FR} = 1.1 \times V_{Fmax}$		300 ns
$V_{FP}$	Forward recovery voltage	$T_j = 25^\circ\text{C}$	$I_F = 15\text{A}$	$dI_F/dt = 100 \text{ A}/\mu\text{s}$	$V_{FR} = 1.1 \times V_{Fmax}$		3 V

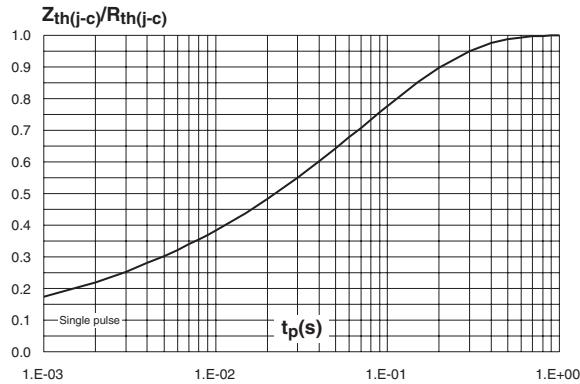
**Figure 1: Conduction losses versus average forward current**



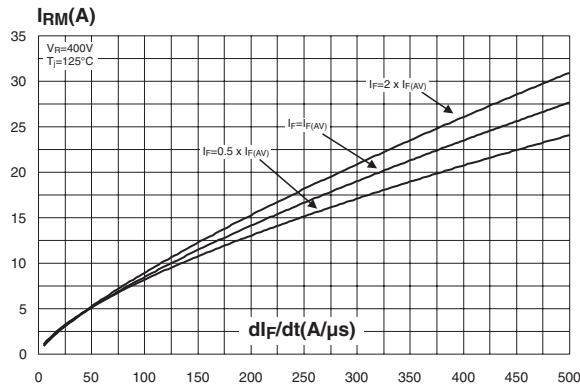
**Figure 2: Forward voltage drop versus forward current**



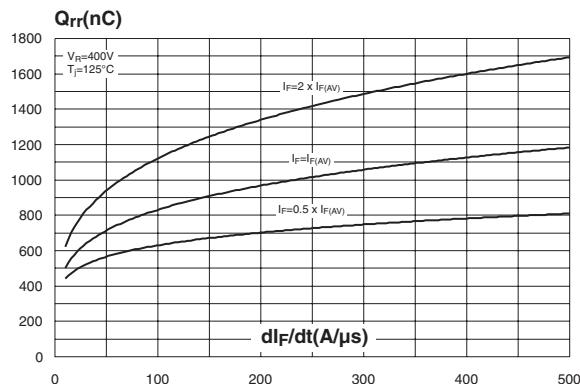
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC & D<sup>2</sup>PAK)**



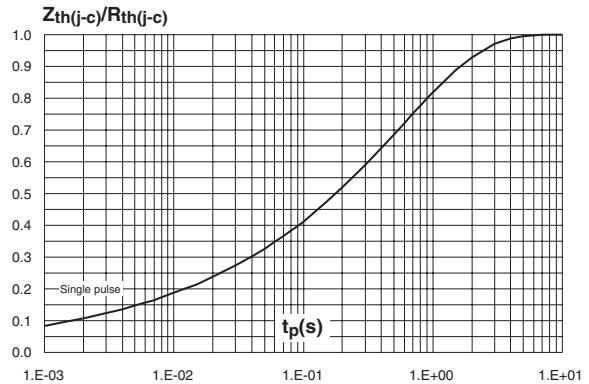
**Figure 5: Peak reverse recovery current versus  $dI_F/dt$  (typical values)**



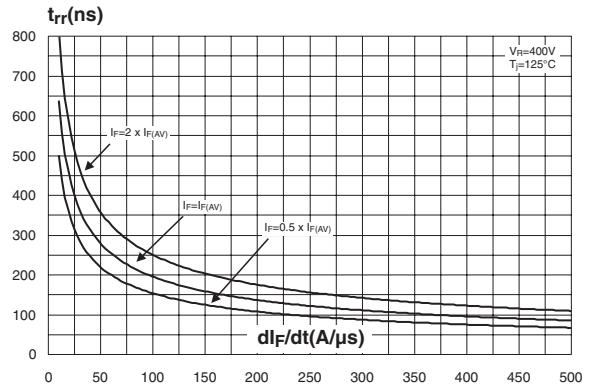
**Figure 7: Reverse recovery charges versus  $dI_F/dt$  (typical values)**



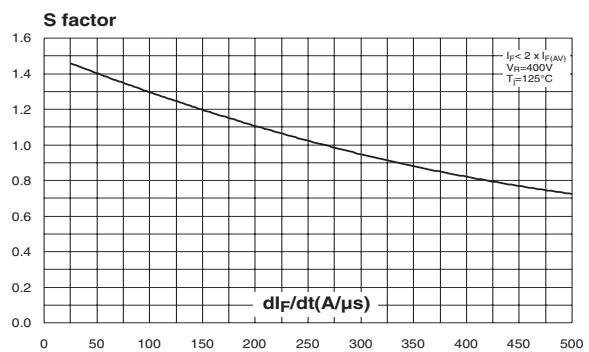
**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)**



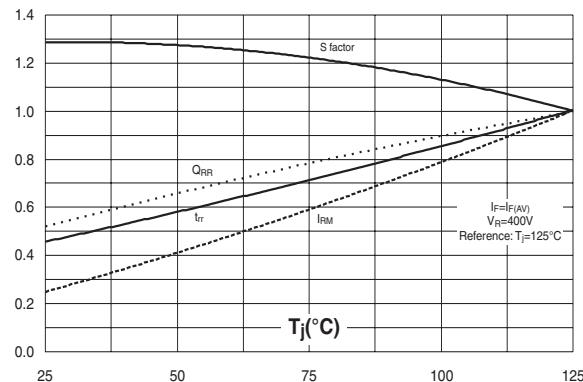
**Figure 6: Reverse recovery time versus  $dI_F/dt$  (typical values)**



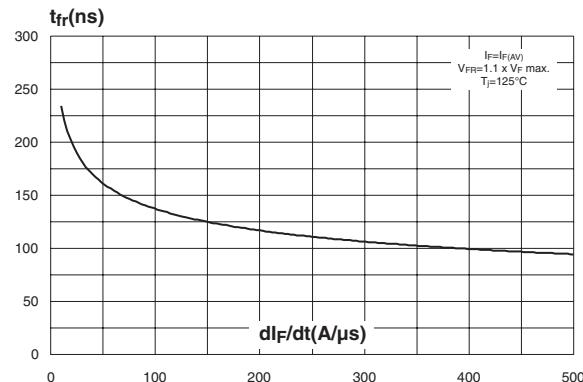
**Figure 8: Reverse recovery softness factor versus  $dI_F/dt$  (typical values)**



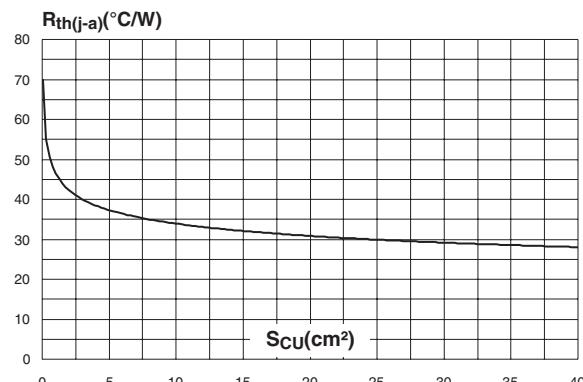
**Figure 9: Relative variations of dynamic parameters versus junction temperature**



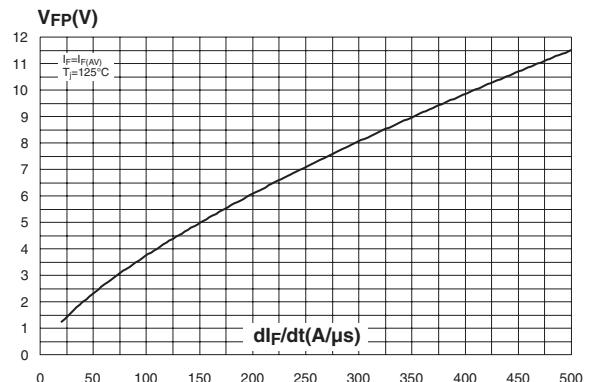
**Figure 11: Forward recovery time versus  $dI_F/dt$  (typical values)**



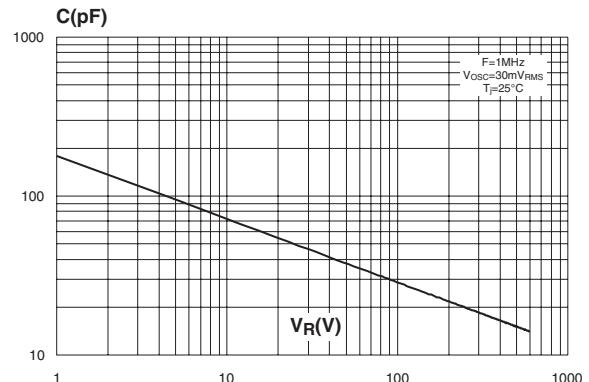
**Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4,  $e_{CU}=35\mu m$ ) (D<sup>2</sup>PAK)**

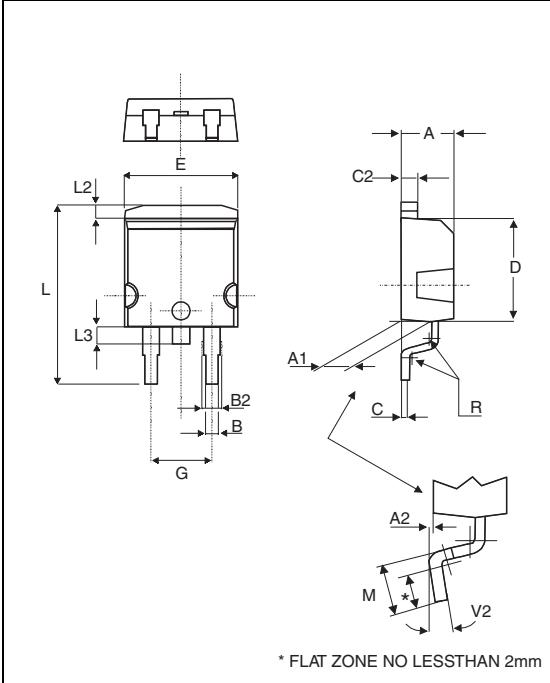


**Figure 10: Transient peak forward voltage versus  $dI_F/dt$  (typical values)**



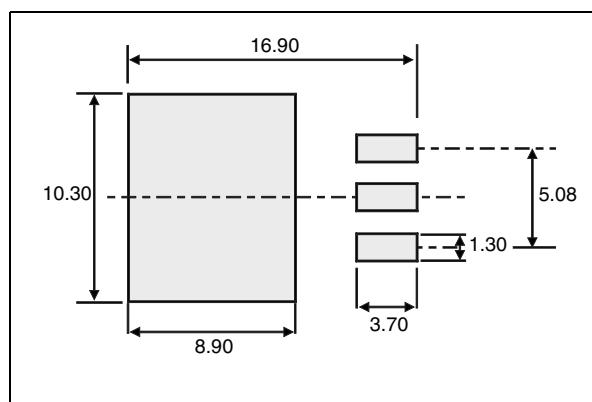
**Figure 12: Junction capacitance versus reverse voltage applied (typical values)**



**Figure 14: D<sup>2</sup>PAK Package Mechanical Data**


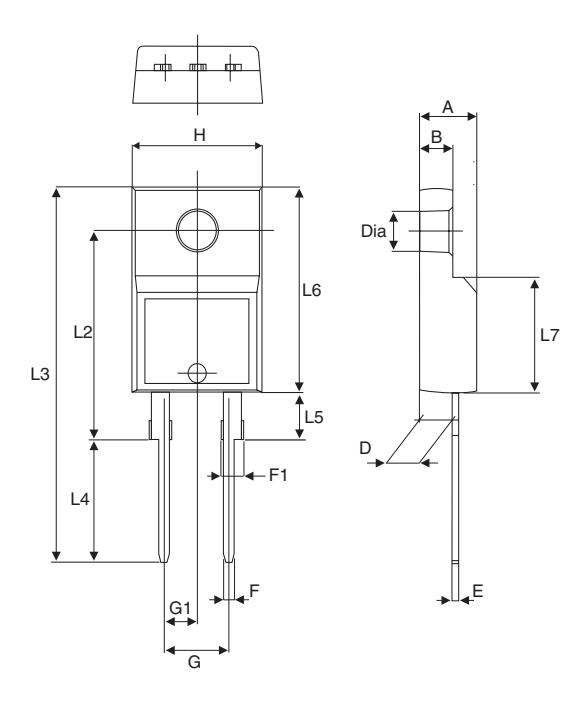
\* FLAT ZONE NO LESS THAN 2mm

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
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 15: D<sup>2</sup>PAK Foot Print Dimensions**  
(in millimeters)

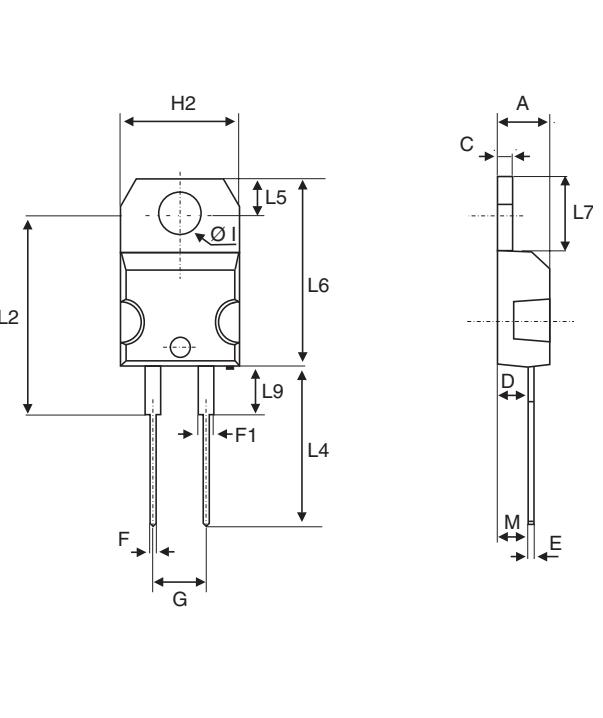
## STTH15L06

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 <sup>2</sup> PAK	1.48 g	50	Tube
STTH15L06G-TR	STTH15L06G	D <sup>2</sup> 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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