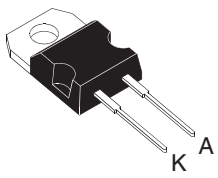
STTH5R06

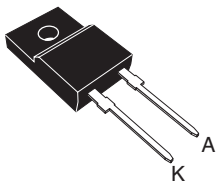
TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

Table 1: Main Product Characteristics

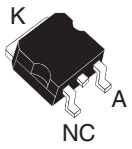
$I_{F(AV)}$	5 A
V_{RRM}	600 V
T_j	175°C
V_F (typ)	1.4 V
t_{rr} (max)	40 ns



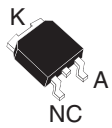
TO-220AC
STTH5R06D



TO-220FPAC
STTH5R06FP



D²PAK
STTH5R06G



DPAK
STTH5R06B

FEATURES AND BENEFITS

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

DESCRIPTION

The STTH5R06, which is using ST Turbo 2 600V technology, is specially suited as boost diode in continuous mode power factor corrections and hard switching conditions. This device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

Table 2: Order Codes

Part Number	Marking
STTH5R06D	STTH5R06D
STTH5R06FP	STTH5R06FP
STTH5R06B	STTH5R06B

Part Number	Marking
STTH5R06B-TR	STTH5R06B
STTH5R06G	STTH5R06G
STTH5R06G-TR	STTH5R06G

Table 3: Absolute Ratings (limiting values)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			600	V
$I_{F(RMS)}$	RMS forward voltage	TO-220AC / TO-220FPAC / D²PAK		20	A
		DPAK		10	
$I_{F(AV)}$	Average forward current	TO-220AC / DPAK / D²PAK	Tc = 135°C δ = 0.5	5	A
		TO-220FPAC	Tc = 105°C δ = 0.5	5	
I_{FSM}	Surge non repetitive forward current		tp = 10ms sinusoidal	50	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature			175	°C

Table 4: Thermal Resistance

Symbol	Parameter		Value (max).	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC / DPA / D^2PAK	3.0	°C/W
		TO-220FPAC	5.5	

Table 5: Static Electrical Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R *	Reverse leakage current	T_j = 25°C	$V_R = V_{RRM}$			20	µA
		T_j = 125°C			25	250	
V_F **	Forward voltage drop	T_j = 25°C	I_F = 5A			2.9	V
		T_j = 125°C			1.4	1.8	

Pulse test: * tp = 5 ms, δ < 2%
** tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation: $P = 1.164 \times I_{F(AV)} + 0.128\ I_F{}^2{}_{(RMS)}$

Table 6: Dynamic Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25°C	I_F = 0.5A Irr = 0.25A I_R =1A			25	ns
			I_F = 1A dI_F/dt = -50 A/µs V_R =30V			40	
I_{RM}	Reverse recovery current	T_j = 125°C	I_F = 5A V_R = 400V dI_F/dt = -200 A/µs		5.0	6.0	A
S factor	Softness factor				0.35		
Qrr	Reverse recovery charges				110		nC
t_{fr}	Forward recovery time	T_j = 25°C	I_F = 5A dI_F/dt = 40 A/µs $V_{FR} = 1.1 \times V_{Fmax}$			150	ns
V_{FP}	Forward recovery voltage	T_j = 25°C	I_F = 5A dI_F/dt = 40 A/µs $V_{FR} = 1.1 \times V_{Fmax}$			4.5	V

Figure 1: Conduction losses versus average current

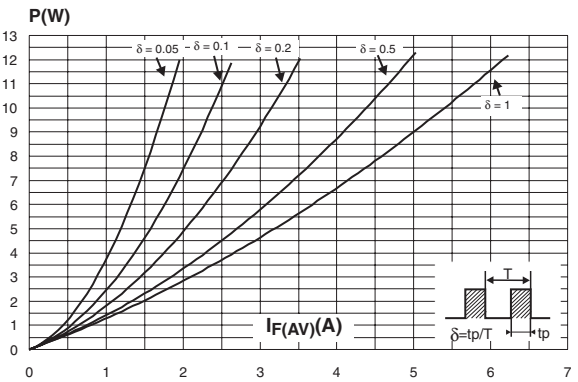


Figure 2: Forward voltage drop versus forward current

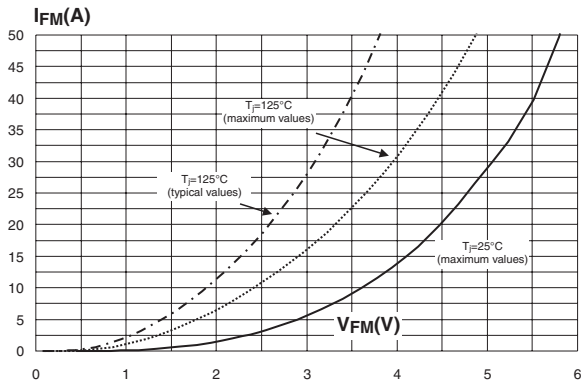


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, DPAK, D²PAK)

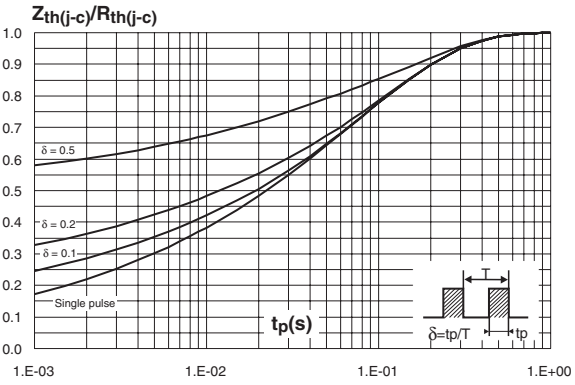


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

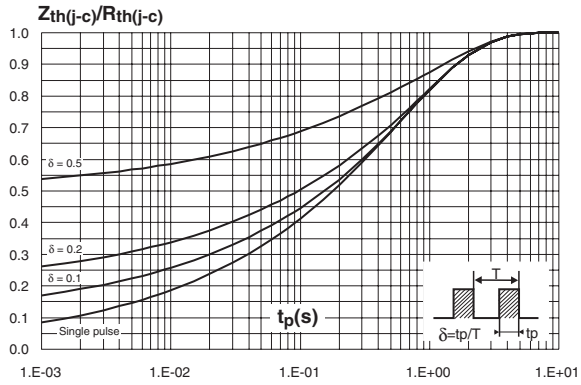


Figure 5: Peak reverse recovery current versus dI_F/dt (90% confidence)

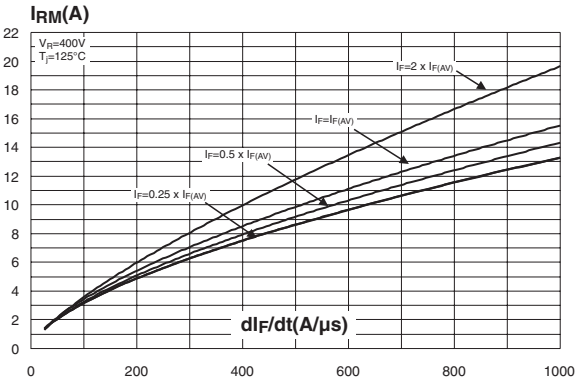


Figure 6: Reverse recovery time versus dI_F/dt (90% confidence)

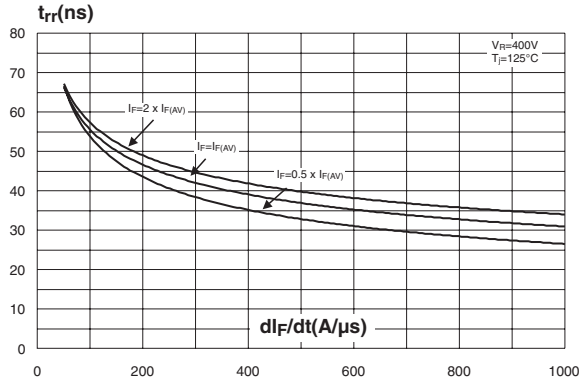


Figure 7: Reverse recovery charges versus dI_F/dt (90% confidence)

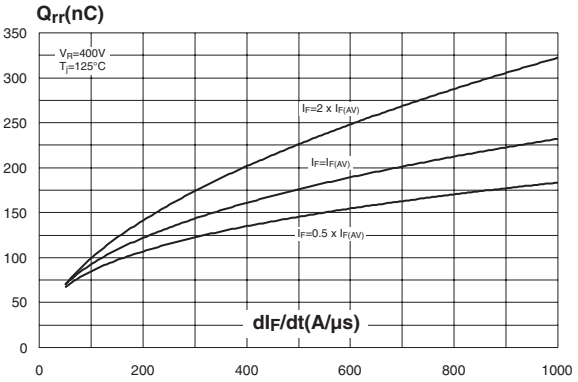


Figure 8: Softness factor versus dI_F/dt (typical values)

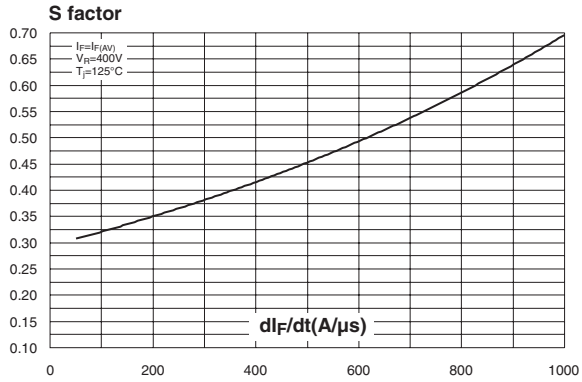


Figure 9: Relative variations of dynamic parameters versus junction temperature

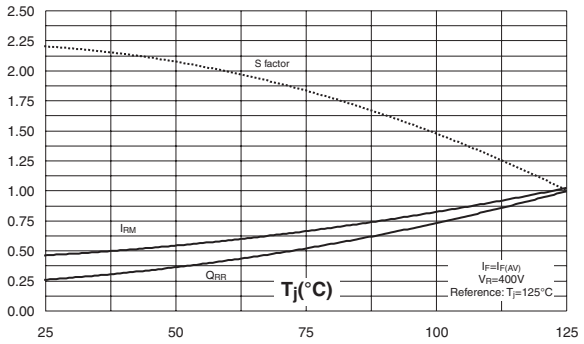


Figure 10: Transient peak forward voltage versus dI_F/dt (90% confidence)

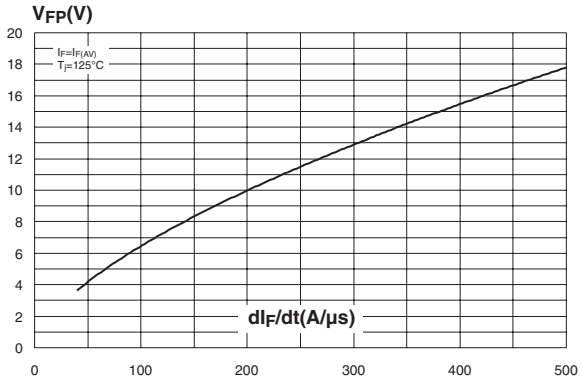


Figure 11: Forward recovery time versus dI_F/dt (90% confidence)

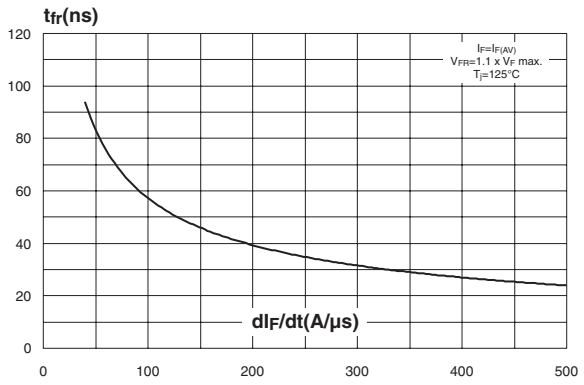


Figure 12: Junction capacitance versus reverse voltage applied (typical values)

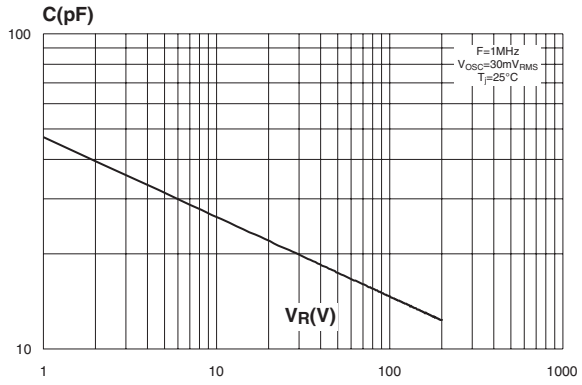


Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, e_{CU}=35µm) (DPAK and D^2PAK)

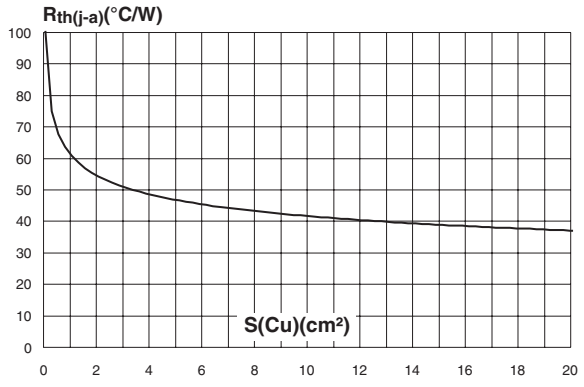
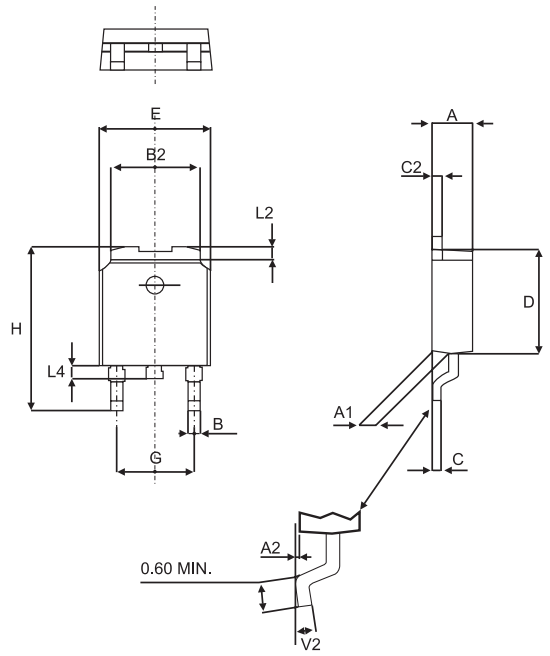


Figure 14: DPAK Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 15: DPAK Foot Print Dimensions
(in millimeters)

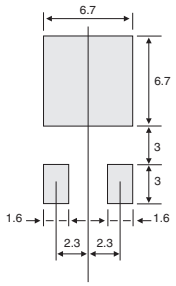
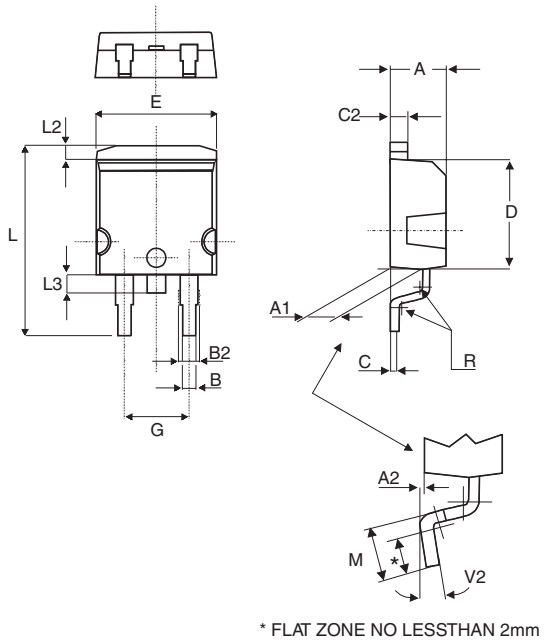


Figure 16: D²PAK Package Mechanical Data



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 17: D²PAK Foot Print Dimensions
(in millimeters)

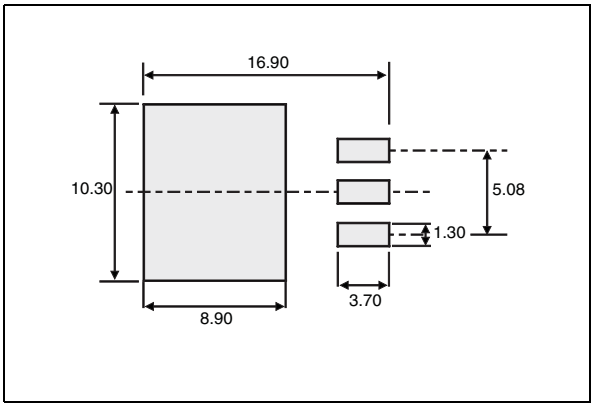
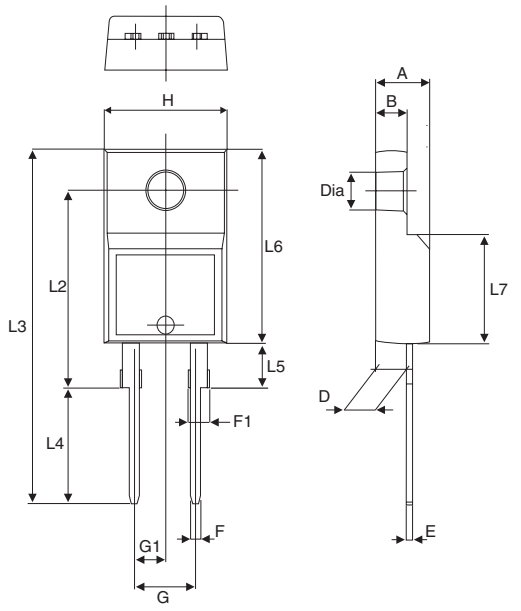
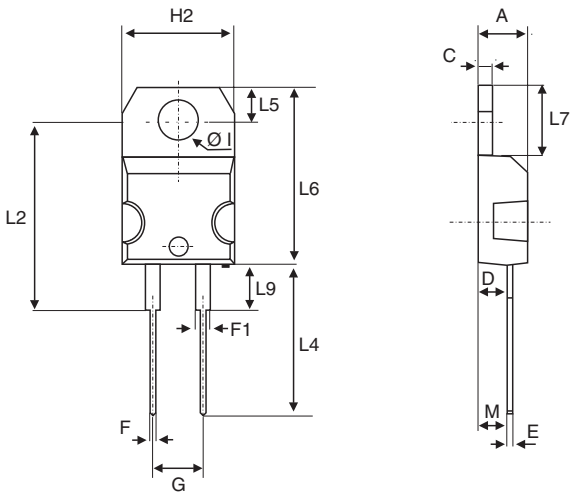


Figure 18: TO-220FPAC Package Mechanical Data



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 19: 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
STTH5R06D	STTH5R06D	TO-220AC	1.90 g	50	Tube
STTHR5R06G	STTH5R06G	D^2PAK	1.48 g	50	Tube
STTHR5R06G-TR	STTHR5R06G	D^2PAK	1.48 g	1000	Tape & reel
STTHR5R06FP	STTHR5R06FP	TO-220FPAC	1.70 g	50	Tube
STTHR5R06B	STTHR5R06B	DPAK	0.3 g	75	Tube
STTHR5R06B-TR	STTHR5R06B-TR	DPAK	0.3 g	2500	Tape & reel

- 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
Oct-2002	3	Last update
07-Sep-2004	4	Tcases values splitted for TO-220FPAC package