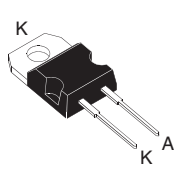
STTH12R06

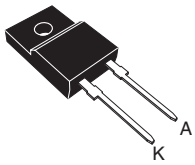
Turbo 2 ultrafast high voltage rectifier

Main product characteristics

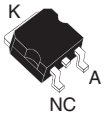
$I_{F(AV)}$	12 A
V_{RRM}	600 V
I_{RM} (typ)	7 A
T_j	175° C
V_F (typ)	1.4 V
t_{rr} (max)	25 ns



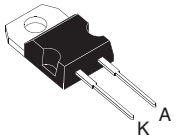
TO-220AC
STTH12R06D



TO-220FPAC
STTH12R06FP



D²PAK
STTH12R06G



TO-220AC Insulated
STTH12R06DIRG

Features and benefits

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses
- Package insulation voltage:
  TO220AC Ins: 2500 V_{RMS}
  TO-220FPAC: 2000 V_{DC}

Description

The STTH12R06, 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.

Order codes

Part Number	Marking
STTH12R06D	STTH12R06D
STTH12R06FP	STTH12R06FP
STTH12R06G	STTH12R06G
STTH12R06G-TR	STTH12R06G
STTH12R06DIRG	STTH12R06DI

1 Characersitics

Table 1. 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 / D^2PAK		30	A
		TO-220AC Ins.		24	
$I_{F(AV)}$	Average forward current δ = 0.5	TO-220AC / D^2PAK	Tc = T125° C	12	A
		TO-220FPAC	Tc = 50° C		
		TO-220AC Ins.	Tc = 80° C		
I_{FSM}	Surge non repetitive forward current		tp = 10 ms sinusoidal	100	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature			175	°C

Table 2. Thermal Resistance

Symbol	Parameter		Value (max).	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC / D^2PAK	1.7	°C/W
		TO-220FPAC	4.4	
		TO-220AC Ins.	3.3	

Table 3. Static Electrical Characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			45	µA
		T_j = 125° C			50	600	
V_F	Forward voltage drop	T_j = 25° C	I_F = 12 A			2.9	V
		T_j = 125° C			1.4	1.8	

To evaluate the conduction losses use the following equation:
$P = 1.16 \times I_{F(AV)} + 0.053\ I_F{}^2{}_{(RMS)}$

Table 4. Dynamic Characteristics

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	T_j = 25° C	I_F = 0.5 A Irr = 0.25 A I_R = 1 A			25	ns
			I_F = 1 A dI_F/dt = -50 A/µs V_R = 30 V			45	
I_{RM}	Reverse recovery current	T_j = 125° C	I_F = 12 A V_R = 400 V dI_F/dt = -200 A/µs		7.0	8.4	A
S factor	Softness factor				0.2		
Qrr	Reverse recovery charges				180		nC
t_{fr}	Forward recovery time	T_j = 25° C	I_F = 12 A dI_F/dt = 96 A/µs $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
V_{FP}	Forward recovery voltage					5.5	V

Figure 1. Conduction losses versus average current

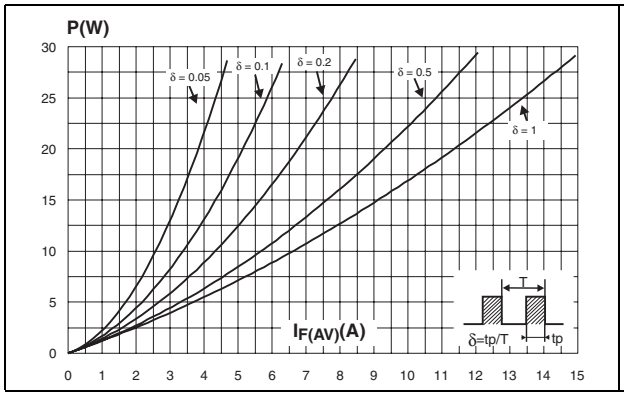


Figure 2. Forward voltage drop versus forward current

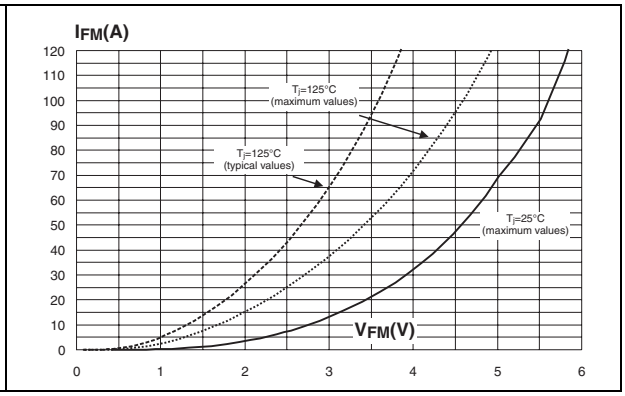


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, TO-220AC Ins, D²PAK))

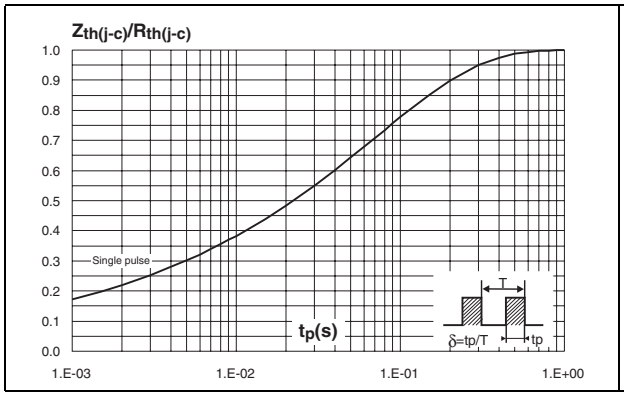


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

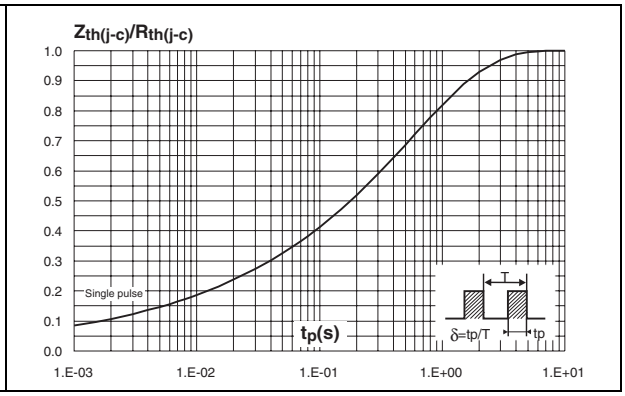


Figure 5. Peak reverse recovery current versus dI_F/dt (typical values)

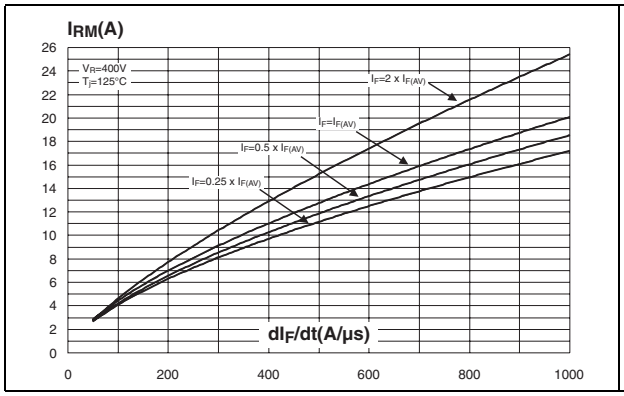


Figure 6. Reverse recovery time versus dI_F/dt (typical values)

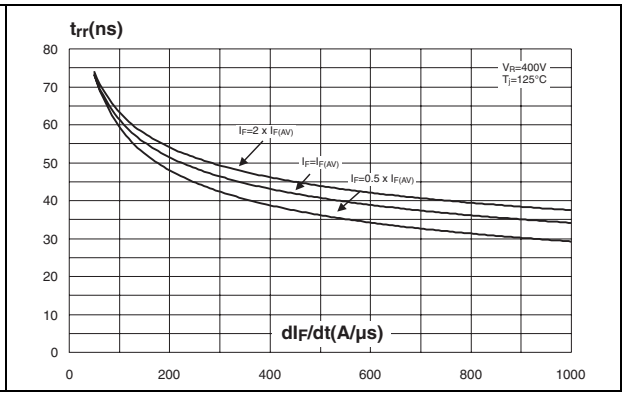


Figure 7. Reverse recovery charges versus dI_F/dt (typical values)

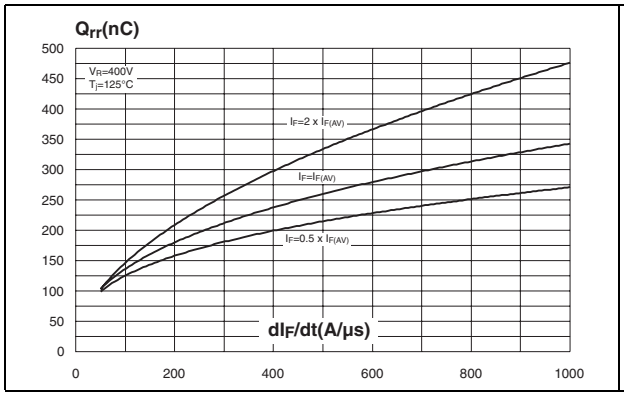


Figure 8. Softness factor versus dI_F/dt (typical values)

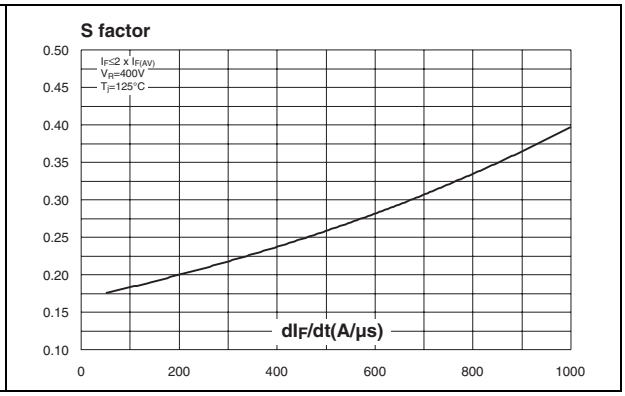


Figure 9. Relative variations of dynamic parameters versus junction temperature

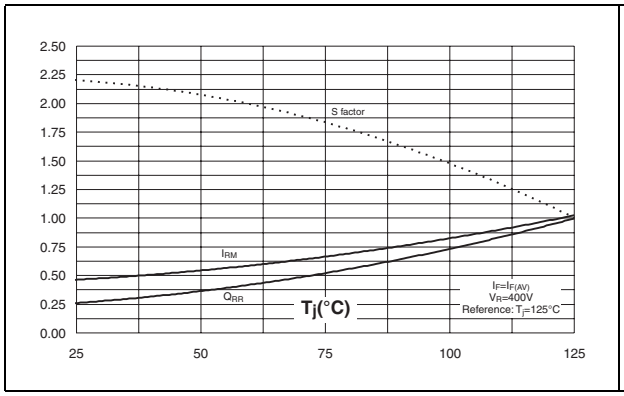


Figure 10. Transient peak forward voltage versus dI_F/dt (typical values)

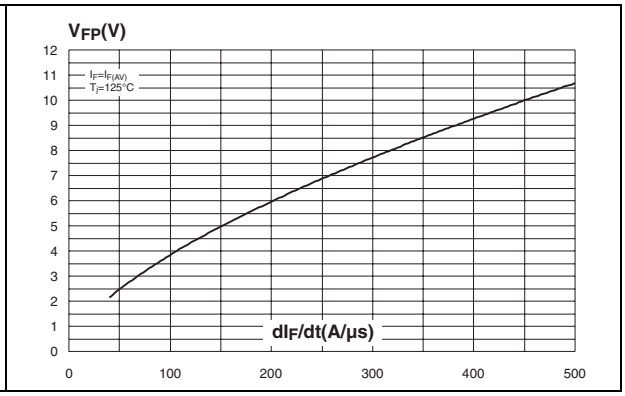


Figure 11. Forward recovery time versus dI_F/dt (typical values)

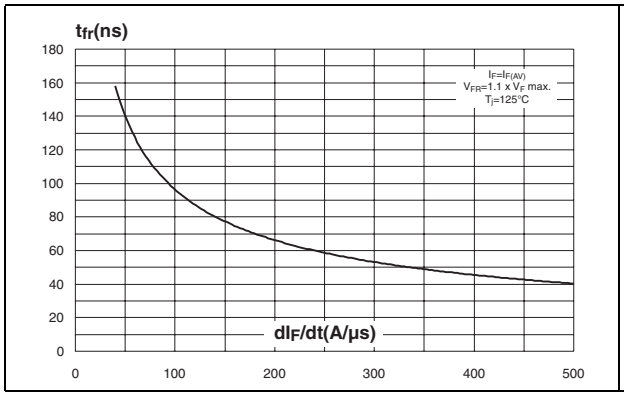


Figure 12. Junction capacitance versus reverse voltage applied (typical values)

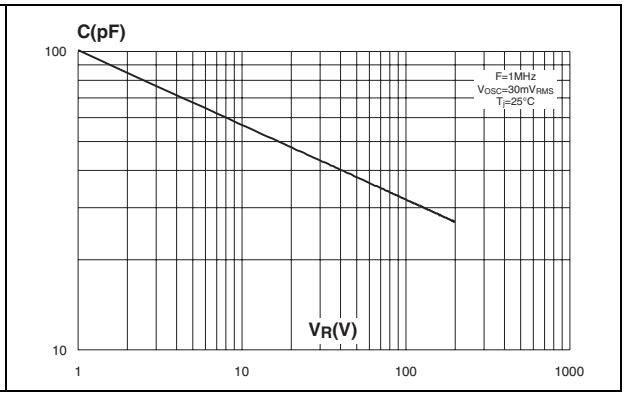
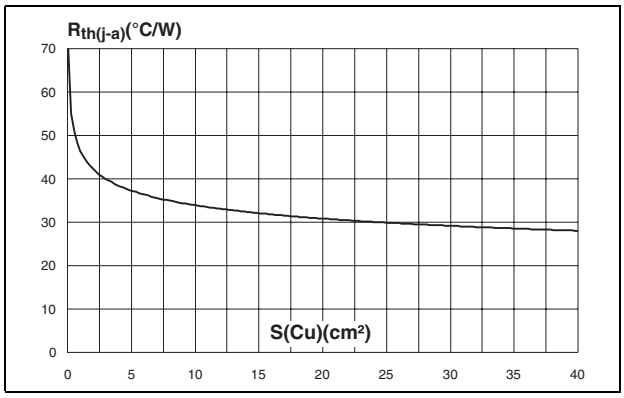


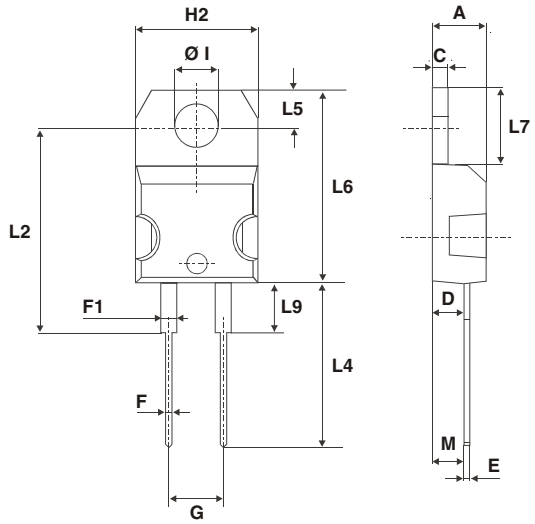
Figure 13. Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, e_{CU} = 35 µm) (D^2PAK)



2 Package information

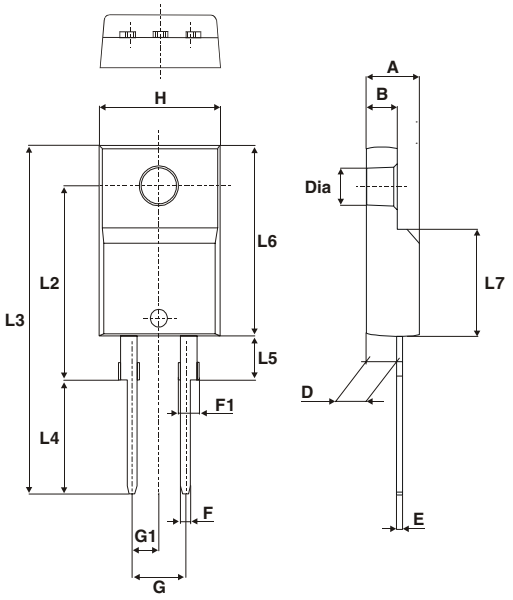
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 Nm (TO-220FPAC) / 0.55 Nm (TO-220AC)
- Maximum torque value: 1.0 Nm (TO-220FPAC) / 0.70 Nm (TO-220AC)

Table 5. TO-220AC dimensions



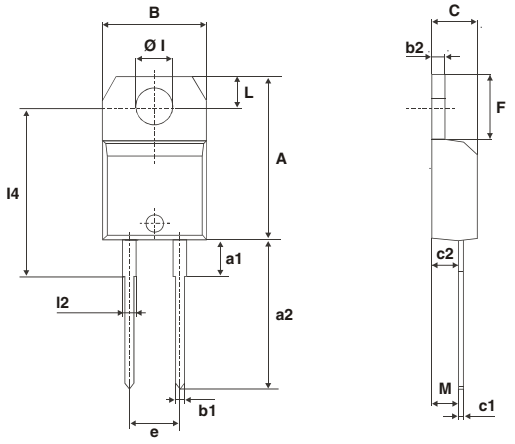
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	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 6. TO-220FPAC Dimensions



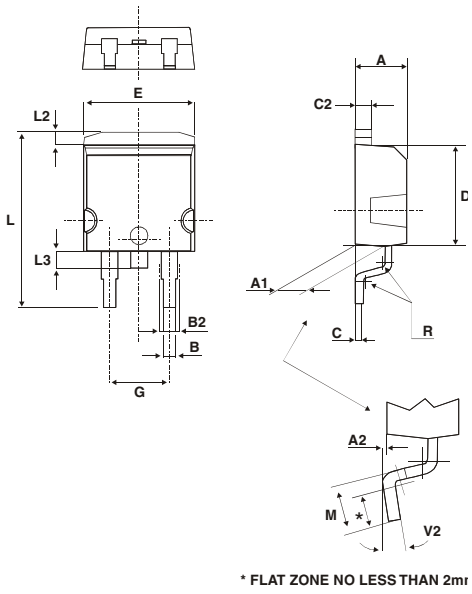
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	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 7. TO-220AC (NIns. & Ins. 20-up) Dimensions



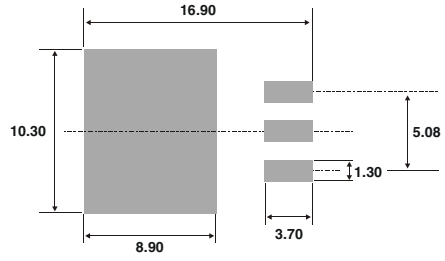
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094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

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH12R06D	STTH12R06D	TO-220AC	1.90 g	50	Tube
STTH12R06G	STTH12R06G	D^2PAK	1.48 g	50	Tube
STTH12R066G-TR	STTH12R06G	D^2PAK	1.48 g	1000	Tape & reel
STTH12R06FP	STTH12R06FP	TO-220FPAC	1.70 g	50	Tube
STTH12R06DIRG	STTH12R06DI	TO-220AC Ins.	1.86 g	50	Tube

4 Revision history

Date	Revision	Changes
January-2002	1	First issue
18-Oct-2004	2	D^2PAK and TO-220AC Insulated packages added
10-Aug-2006	3	Reformatted to current standard. Added Package insulation voltages on page 1

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