

Turbo 2 ultrafast high voltage rectifier

Features

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

Description

The STTH15R06D/FP, which is using ST Turbo 2 600 V technology, is specially suited as boost diode in continuous mode power factor corrections and hard switching conditions.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

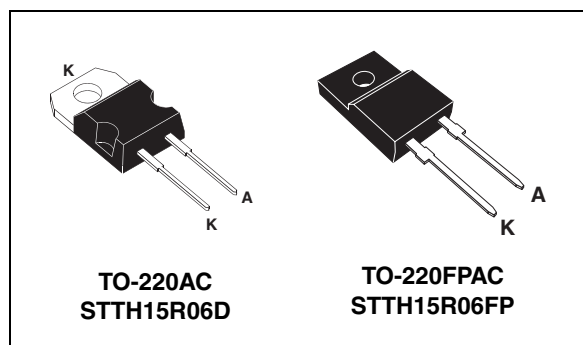


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	15 A
V_{RRM}	600 V
$I_{RM(typ)}$	8 A
$T_j(max)$	175 °C
$V_F(max)$	1.8 V
$t_{rr(max)}$	50 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		15	A
I_{FSM}	Surge non repetitive forward current	$T_p = 10$ ms sinusoidal	150	A
T_{stg}	Storage temperature range		-65 to + 175	°C
T_j	Maximum operating junction temperature		175	°C

Table 3. Thermal parameter

Symbol	Parameter		Maximum	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC	1.5	°C/W
		TO-220FPAC	4.0	

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R	Reverse leakage current	$T_j = 25$ °C	$V_R = 600$ V			60	μ A
		$T_j = 125$ °C			70	800	
V_F	Forward voltage drop	$T_j = 25$ °C	$I_F = 15$ A			2.9	V
		$T_j = 125$ °C			1.4	1.8	

To evaluate the maximum conduction losses use the following equation:

$$P = 1.16 \times I_{F(AV)} + 0.043 I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$, $I_{rr} = 0.25\text{ A}$, $I_R = 1\text{ A}$			30	ns
			$I_F = 1\text{ A}$, $dI_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$			50	
I_{RM}		$T_j = 125\text{ °C}$	$I_F = 15\text{ A}$, $dI_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 400\text{ V}$		7.5	9.0	A
S_{factor}					0.15		-
Q_{rr}					220		nC
t_{fr}	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$, $dI_F/dt = 120\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
V_{FP}	Forward recovery voltage					6	V

Figure 1. Conduction losses versus average current

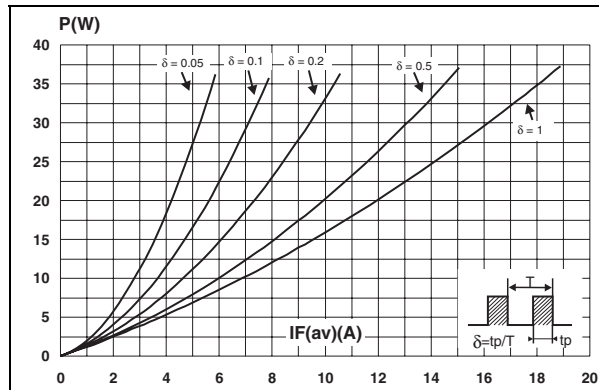


Figure 2. Forward voltage drop versus forward current

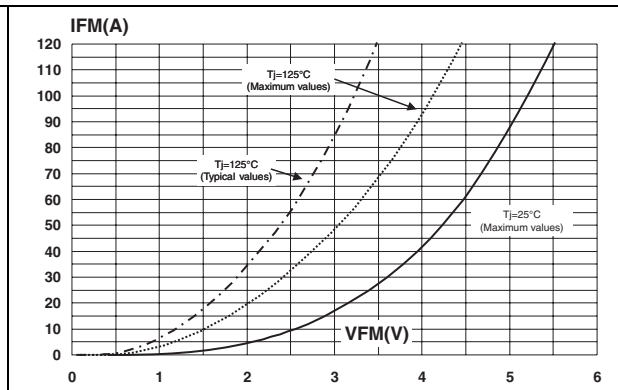


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC)

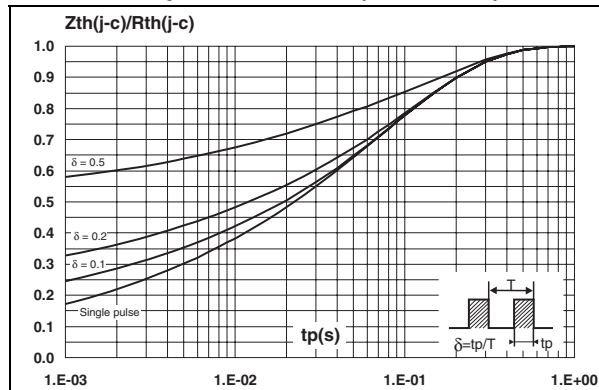


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

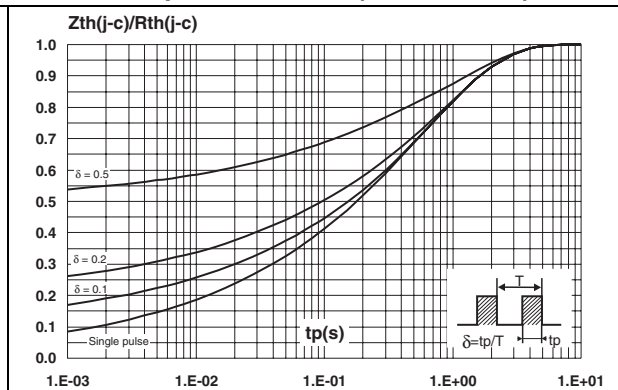
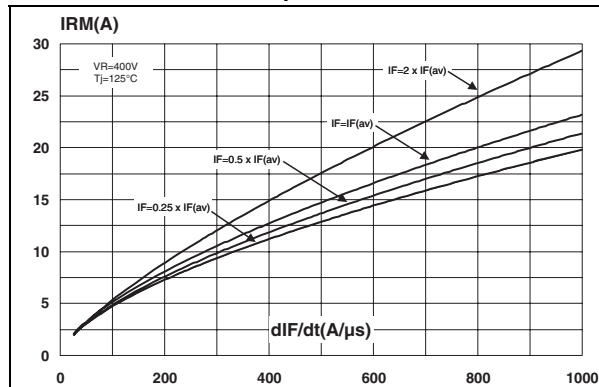
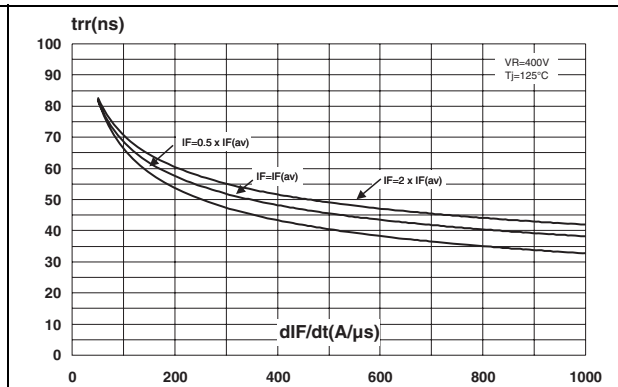
Figure 5. Peak reverse recovery current versus dI_F/dt (90% confidence)Figure 6. Reverse recovery time versus dI_F/dt (90% confidence)

Figure 7. Reverse recovery charges versus di_F/dt (90% confidence)

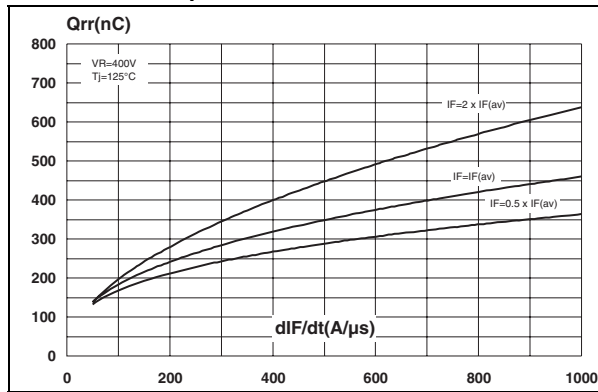


Figure 8. Softness factor versus di_F/dt (typical values)

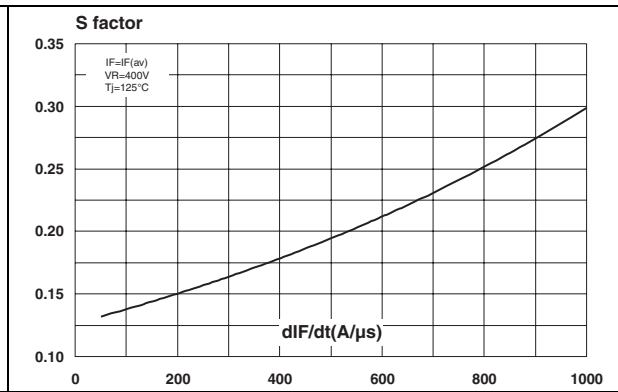


Figure 9. Relative variation of dynamic parameters versus junction temperature

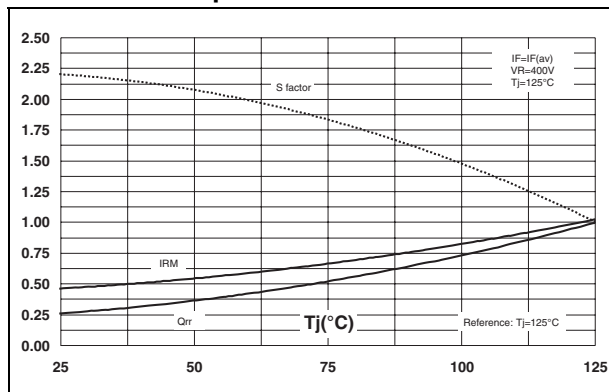


Figure 10. Transient peak forward voltage versus di_F/dt (90% confidence)

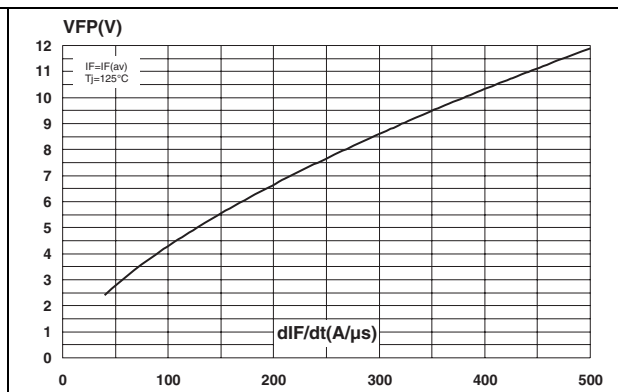


Figure 11. Forward recovery time versus di_F/dt (90% confidence)

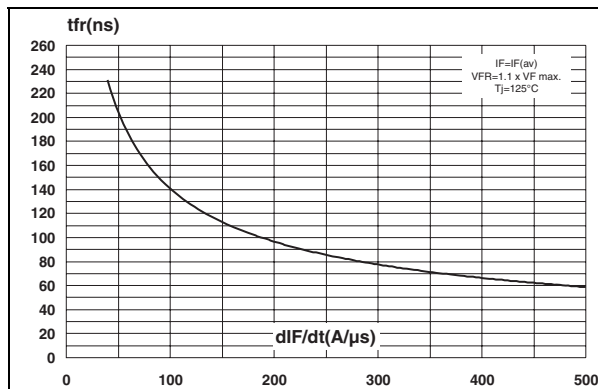
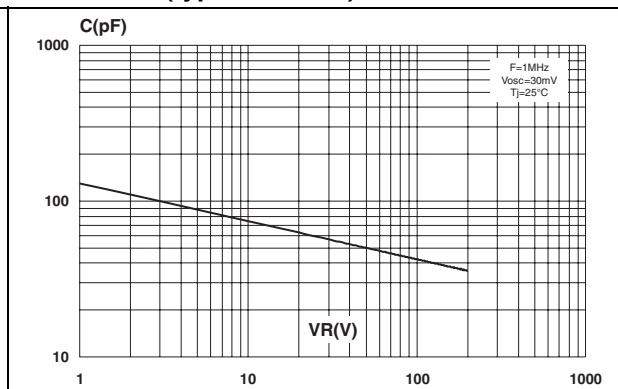


Figure 12. Junction capacitance versus reverse voltage applied (typical values)



2 Package information

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

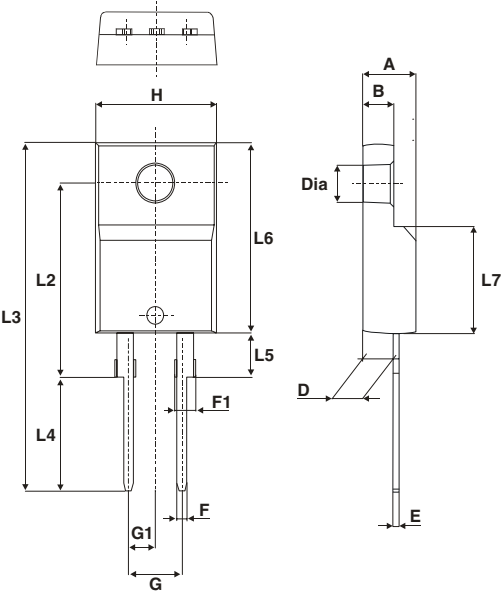
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. 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 7. 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



The technical drawing illustrates the TO-220FPAC package in three views: top, side, and a detail of the mounting tab. The top view shows the package body with dimensions H (width), L2 (lead length), L3 (total height), L4 (lead thickness), L5 (tab thickness), L6 (body height), and L7 (tab height). The side view shows dimensions A (lead width), B (lead thickness), D (tab width), E (tab thickness), F (tab length), F1 (tab width), G (tab length), and G1 (tab width). The detail view shows the mounting tab with dimensions Dia. (hole diameter) and D (tab width).

3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH15R06D	STTH15R06D	TO-220AC	1.9 g	50	Tube
STTH15R06FP	STTH15R06FP	TO-220FPAC	1.7 g	50	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
Jan-2002	1B	Last issue.
18-Jul-2011	2	Updated I_{FSM} from 120 A to 150 A.

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