Turbo 2 ultrafast high voltage rectifier

Technical Literature

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Version	Release Date	Change Qualifier
Rev 2.1		Initial Release
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STTH30R06

Turbo 2 ultrafast high voltage rectifier

Features

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

Description

The STTH30R06, which is using ST Turbo 2 600 V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.

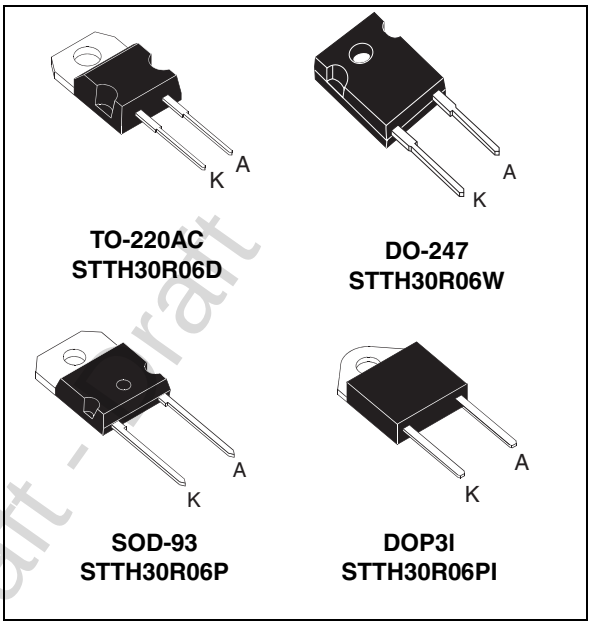

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	30 A
V_{RRM}	600 V
T_j	175 °C
V_F (typ)	1.10 V
t_{rr} (max)	50 ns

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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			50	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AC / DO-247 / SOD-93	Tc = 115 °C	30	A
		DOP3I	Tc = 85 °C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		300	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature			175	°C

Table 3. Thermal parameters

Symbol	Parameter		Value (max)	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC / DO-247/ SOD-93	1.1	°C/W
		DOP3I	1.7	

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			25	µA
		T_j= 125 °C			80	800	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 30 A			1.85	V
		T_j = 125 °C			1.10	1.40	

1. Pulse test: t_p = 5 ms, δ < 2 %
2. Pulse test: t_p = 380 µs, δ < 2 %

To evaluate the maximum conduction losses use the following equation:
$P = 1.07 \times I_{F(AV)} + 0.011\ I_F{}^2{}_{(RMS)}$

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Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A			50	ns
			I_F = 1 A, dI_F/dt = 50 A/µs, V_R = 30 V		50	70	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 30 A, dI_F/dt = 100 A/µs, V_R = 400 V		8.0	11	A
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 30 A, dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}			500	ns
V_{FP}	Forward recovery voltage				2.5		V

Figure 1. Conduction losses versus average current

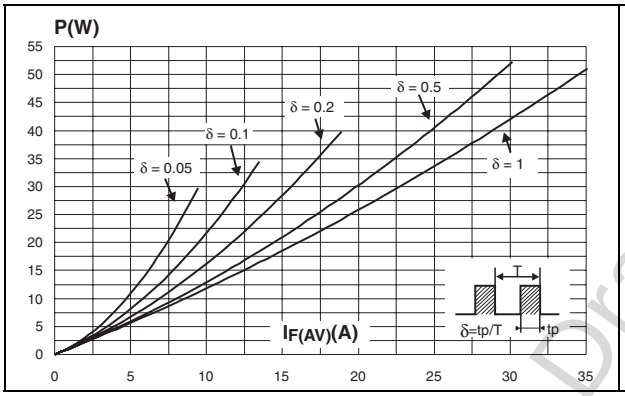

Figure 2. Forward voltage drop versus forward current

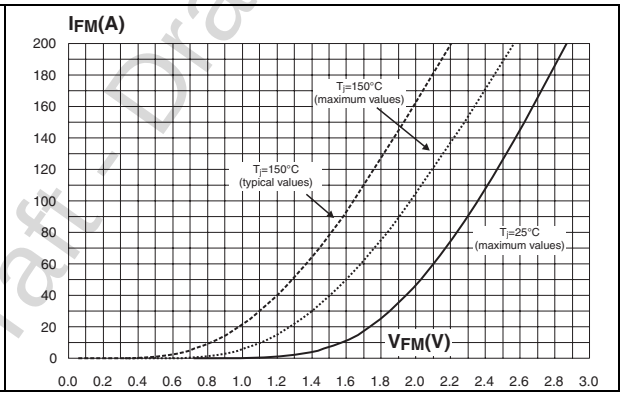

Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

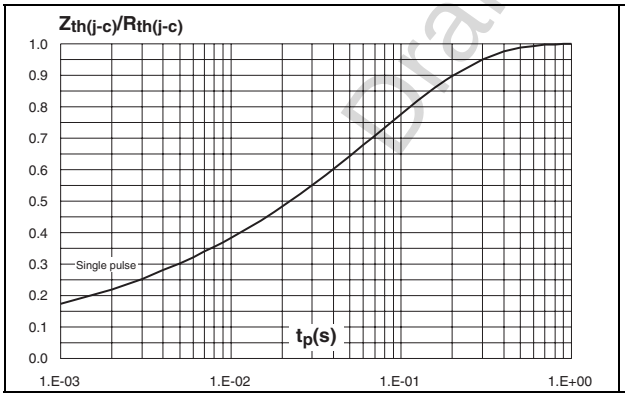

Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

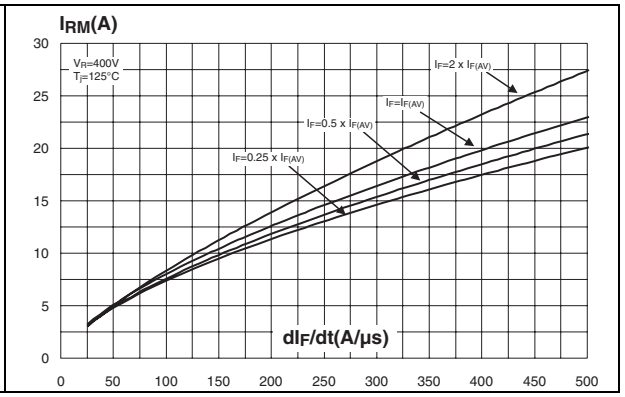

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Figure 5. Reverse recovery time versus dI_F/dt (typical values)

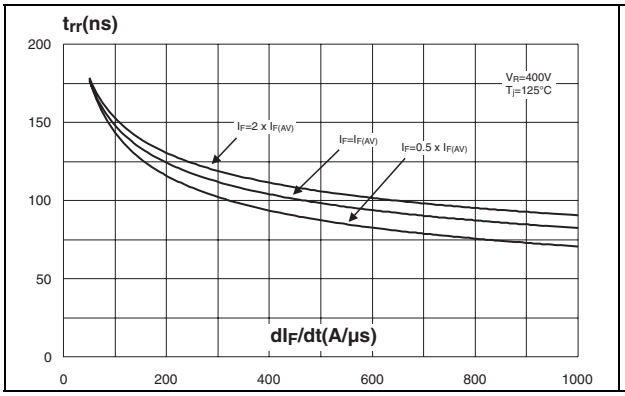

Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

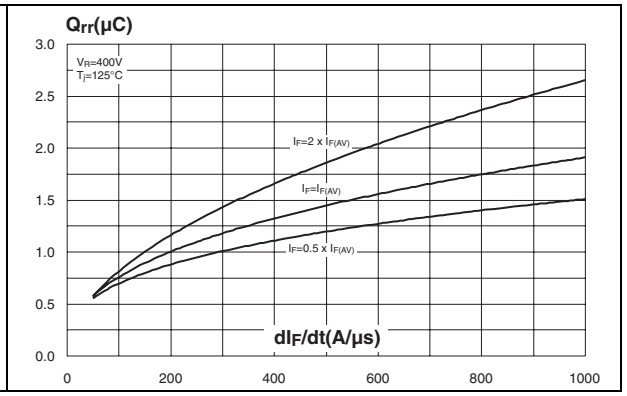

Figure 7. Softness factor versus dI_F/dt (typical values)

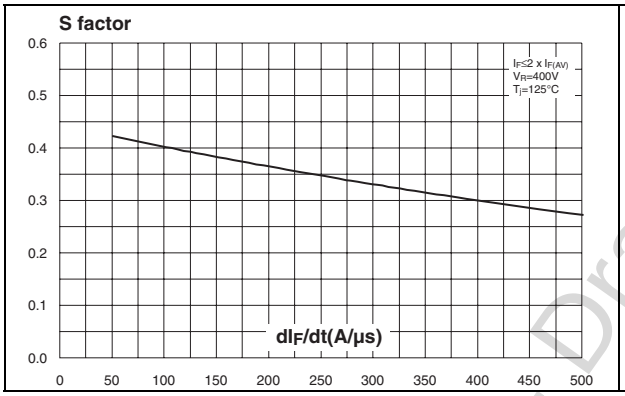

Figure 8. Relative variations of dynamic parameters versus junction temperature

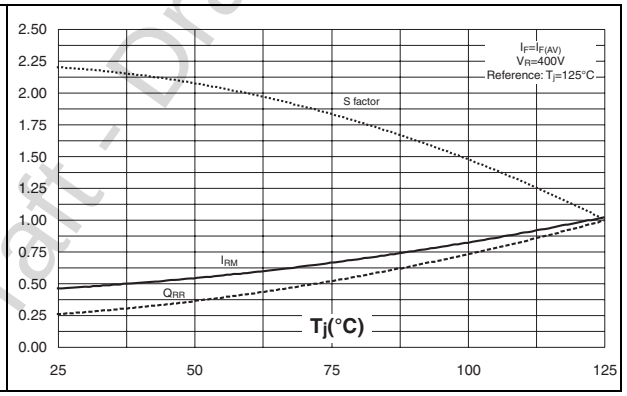

Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

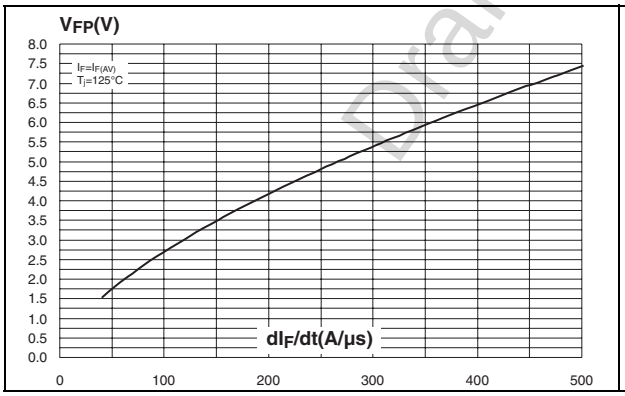

Figure 10. Forward recovery time versus dI_F/dt (typical values)

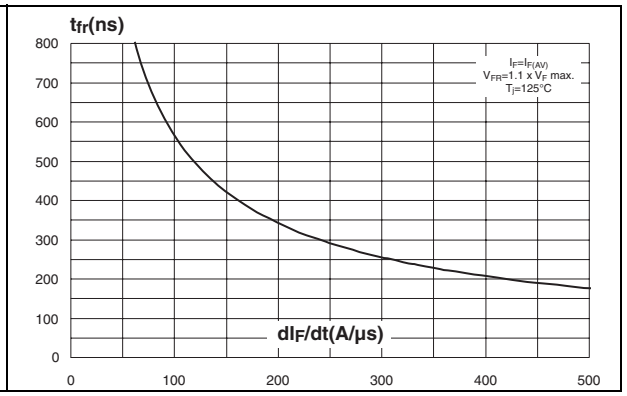

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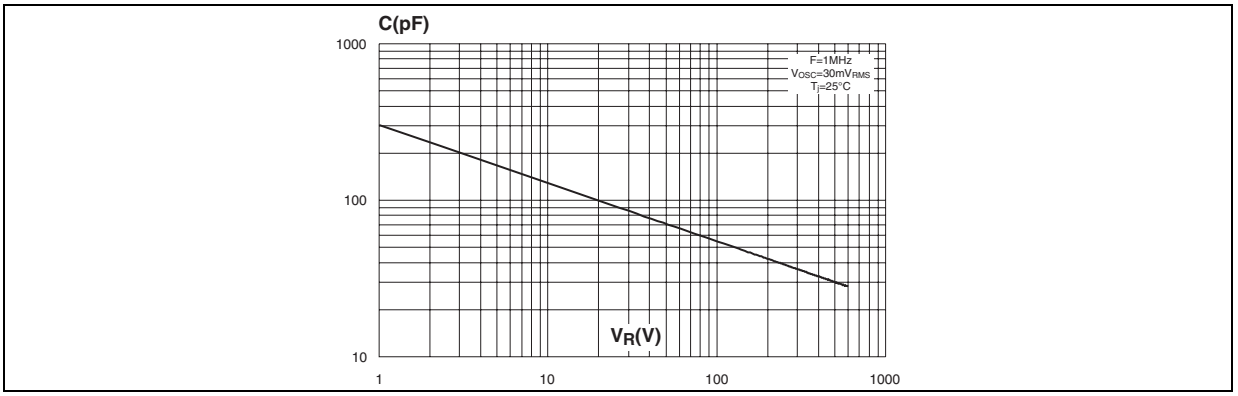
Figure 11. Junction capacitance versus reverse voltage applied (typical values)



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2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m (TO-220AC)

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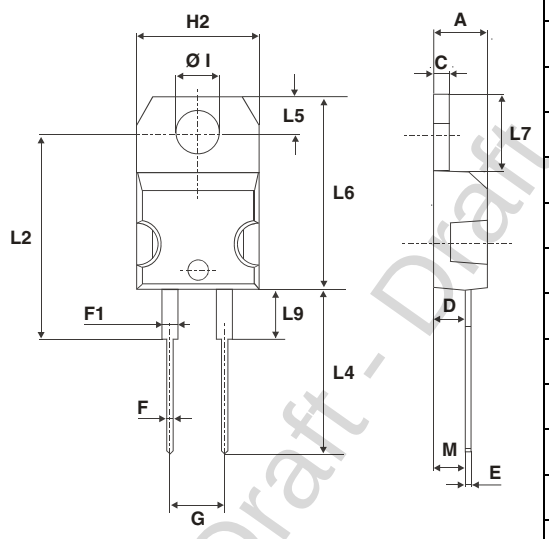
Table 6. TO-220AC dimensions



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

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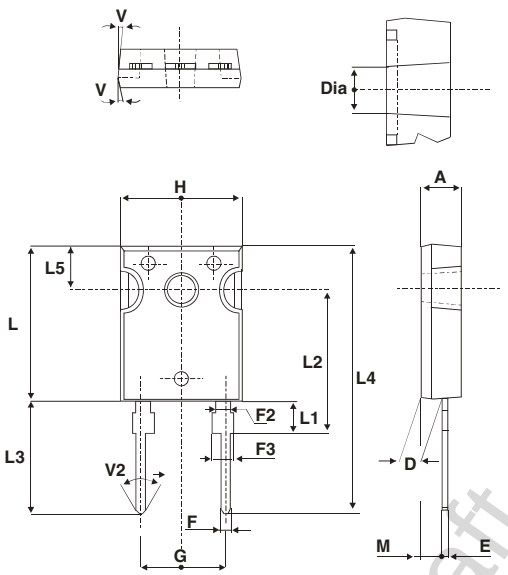
Table 7. DO247 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

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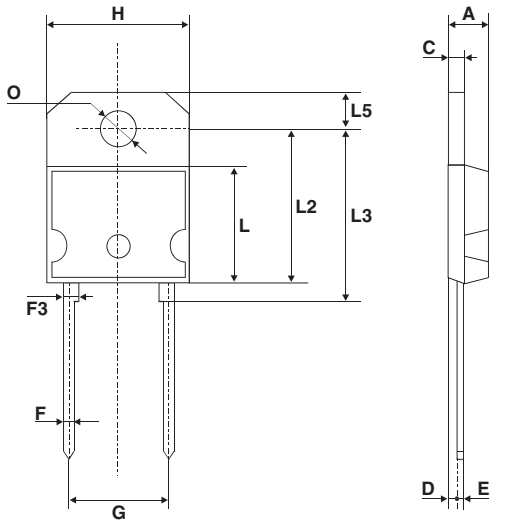
Table 8. SOD-93 dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.70	4.90	0.185	0.193
C	1.17	1.37	0.046	0.054
D	2.50 Typ.		0.098 Typ.	
D1	1.27 Typ.		0.050 Typ.	
E	0.50	0.78	0.020	0.031
F	1.10	1.30	0.043	0.051
F3	1.75 Typ.		0.069 Typ	
G	10.80	11.10	0.425	0.437
H	14.70	15.20	0.578	0.598
L		12.20		0.480
L2		16.20		0.638
L3	18.0 Typ		0.709 Typ.	
L5	3.95	4.15	0.156	0.163
L6	31.00 Typ.		1.220 Typ.	
O	4.00	4.10	0.157	0.161

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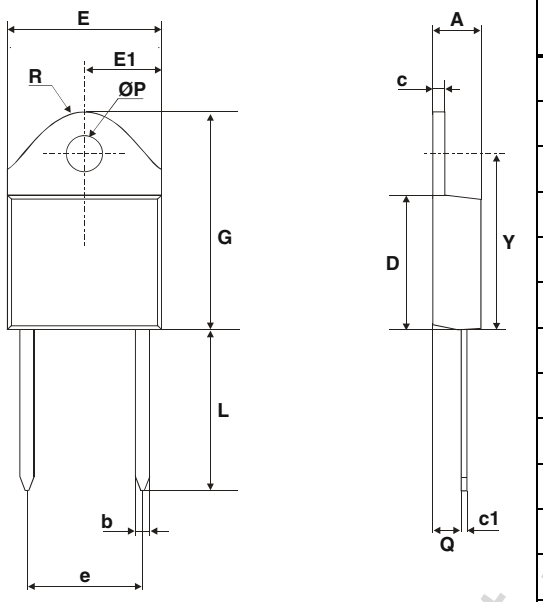
Table 9. DOP3 dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	1.20	1.40	0.047	0.055
c	1.45	1.55	0.057	0.061
c1	0.50	0.70	0.020	0.028
D	12.15	13.10	0.474	0.516
E	15.10	15.50	0.594	0.610
E1	7.55	7.75	0.297	0.305
e	10.80	11.30	0.425	0.445
G	20.4	21.10	0.815	0.831
L	14.35	15.60	0.565	0.614
P	4.08	4.17	0.161	0.164
Q	2.70	2.90	0.106	0.114
R	4.60 typ.		0.181 typ.	
Y	15.80	16.50	0.622	0.650

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3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH30R06D	STTH30R06D	TO-220AC	1.90 g	50	Tube
STTH30R06W	STTH30R06W	DO-247	4.40 g	30	Tube
STTH30R06P	STTH30R06P	SOD-93	3.79 g	30	Tube
STTH30R06PI	STTH30R06PI	DOP3I	4.46 g	30	Tube

4 Revision history

Table 11. Document revision history

Date	Revision	Changes
18-Oct-2004	1	First issue.
07-Sep-2011	2	Updated I_{FSM} from 160 A to 300 A.

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