STTH2002C

High efficiency ultrafast diode

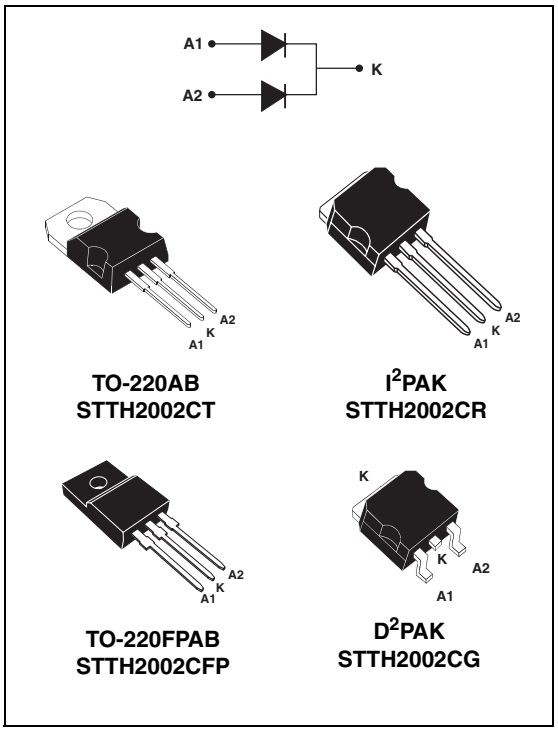
Features

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- Low leakage current
- High junction temperature
- Insulated package: TO-220FPAB

Description

Dual center tap rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in TO-220AB, D^2PAK, TO-220FPAB and I^2PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



TO-220AB
STTH2002CT

I^2PAK
STTH2002CR

TO-220FPAB
STTH2002CFP

D^2PAK
STTH2002CG

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	Up to 2 x 10 A
V_{RRM}	200 V
T_j (max)	175 °C
V_F(typ)	0.78 V
t_{rr} (typ)	22 ns

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				200	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(peak)}$	Avarage forward current $\delta = 0.5$	I^2PAK, D^2PAK, TO-220AB	T_c = 150 °C	Per diode	10	A
			T_c = 140 °C	Per device	20	A
			T_c = 130 °C	Per diode	15	A
			T_c = 115 °C	Per device	30	A
		TO-220FPAB	T_c = 120 °C	Per diode	10	A
			T_c = 85 °C	Per device	20	A
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal		90	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	I^2PAK, D^2PAK, TO-220AB	Per diode	2.5	°C/W
			Per device	1.6	
		TO-220FPAB	Per diode	5	
			Per device	3.8	
$R_{th(c)}$	Coupling	I^2PAK, D^2PAK, TO-220AB		0.7	
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)\ (per\ diode)} + P_{(diode2)} \times R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			10	µA
		T_j = 125 °C			6	100	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A			1.1	V
		T_j = 25 °C	I_F = 20 A			1.25	
		T_j = 150 °C	I_F = 10 A		0.78	0.89	
		T_j = 150 °C	I_F = 20 A			1.05	

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

To evaluate the conduction losses use the following equation:
$P = 0.73 \times I_{F(AV)} + 0.020\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, V_R = 30 V dI_F/dt = 100 A/µs		22	27	ns
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 10 A, dI_F/dt = 100 A/µs $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
V_{FP}	Forward recovery voltage	T_j = 25 °C	I_F = 10 A, dI_F/dt = 100 A/µs		2.4		V
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 10 A, V_R = 160 V dI_F/dt = 200 A/µs		7.0	9.0	A

Figure 1. Peak current versus duty cycle (per diode)

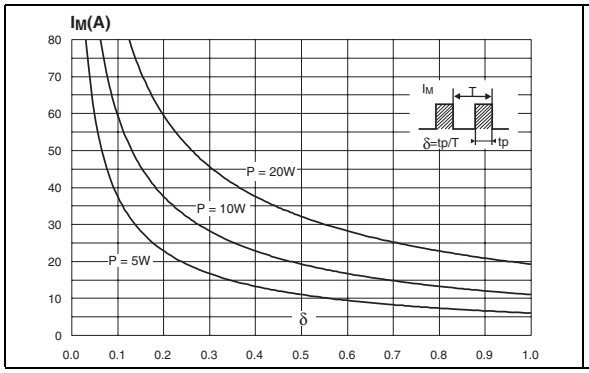


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

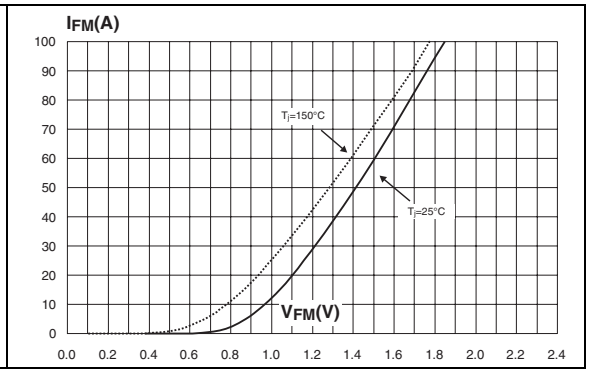


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

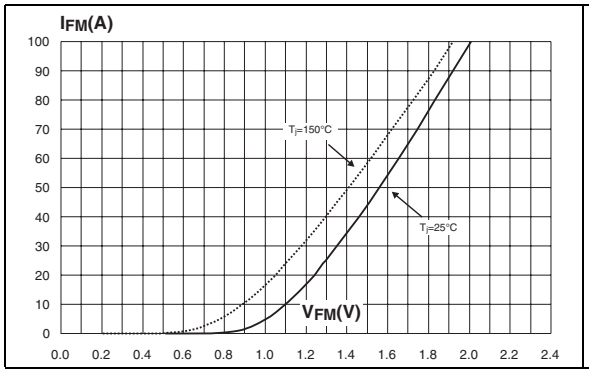


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

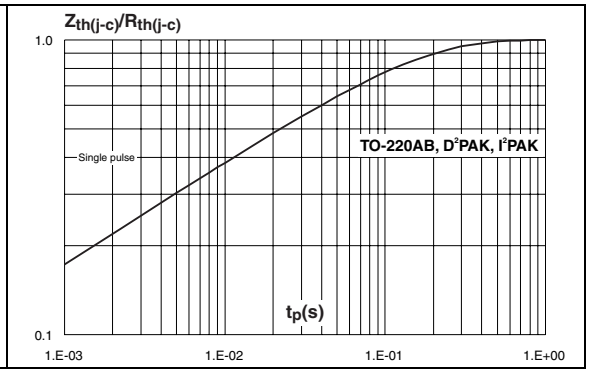


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

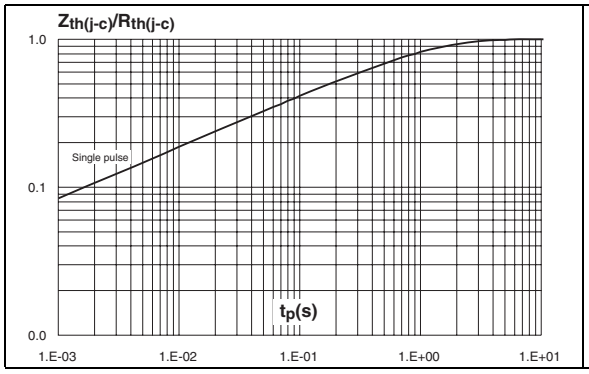


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

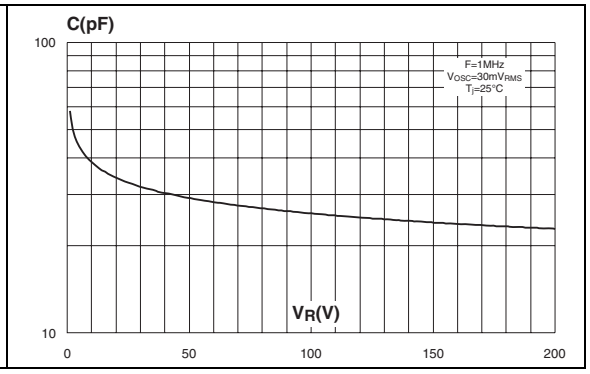


Figure 7. Reverse recovery charges versus dI_F/dt (typical values, per diode)

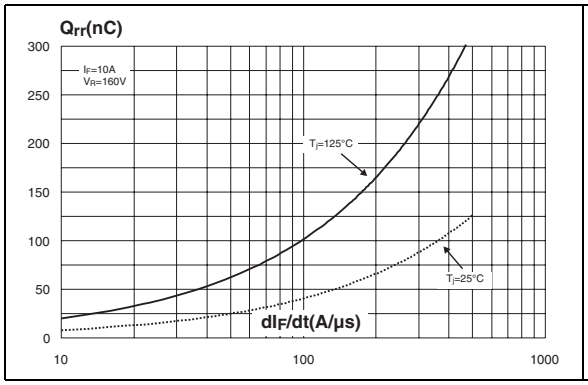


Figure 8. Reverse recovery time versus dI_F/dt (typical values, per diode)

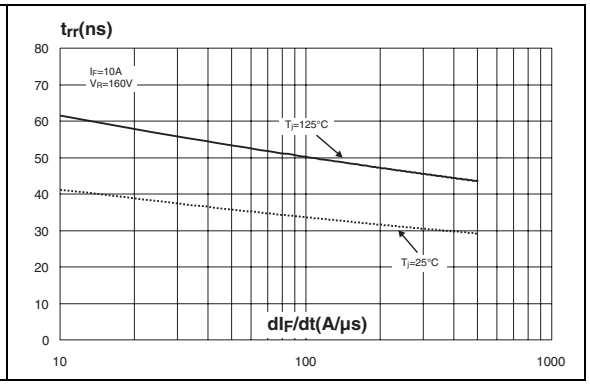


Figure 9. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

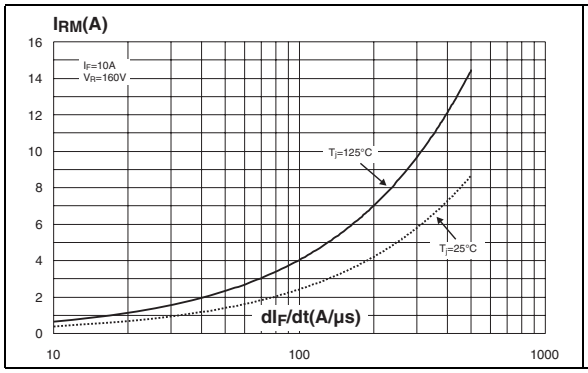


Figure 10. Dynamic parameters versus junction temperature

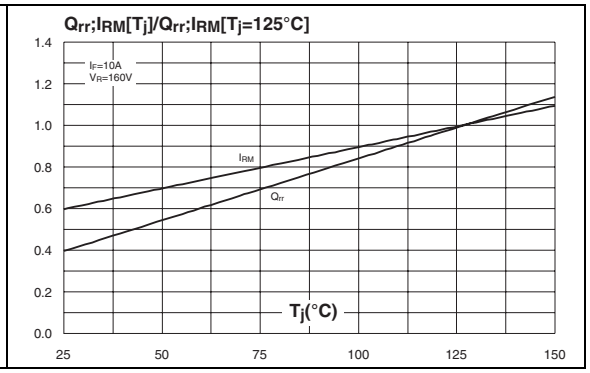
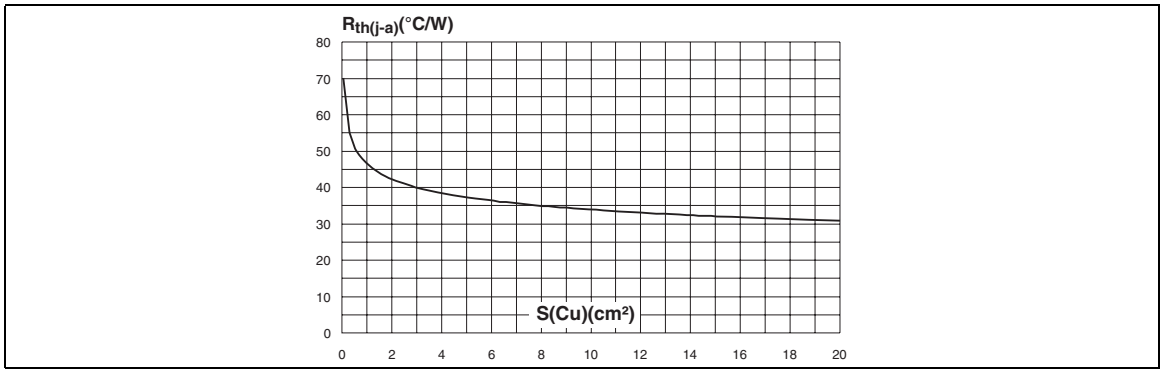


Figure 11. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35 µm) for D^2PAK



2 Package information

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

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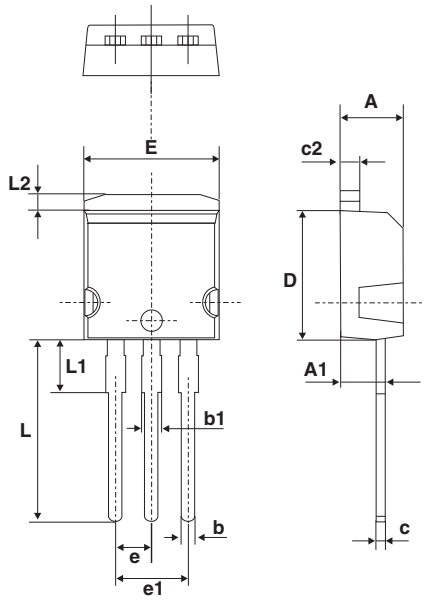
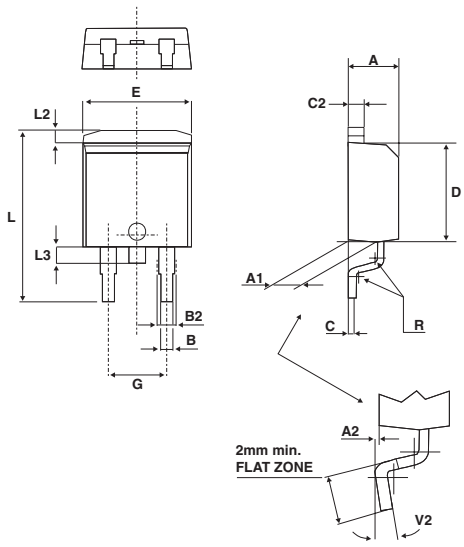
Table 6. I^2PAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

Table 7. D²PAK dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		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	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
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
R	0.40			0.016		
V2	0°		8°	0°		8°

Figure 12. Footprint (dimensions in mm)

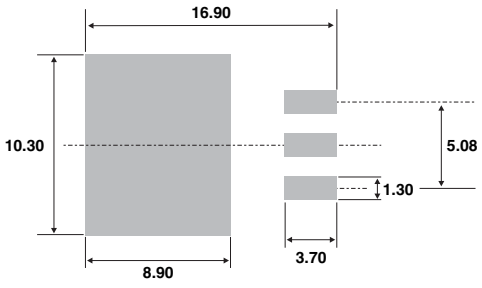
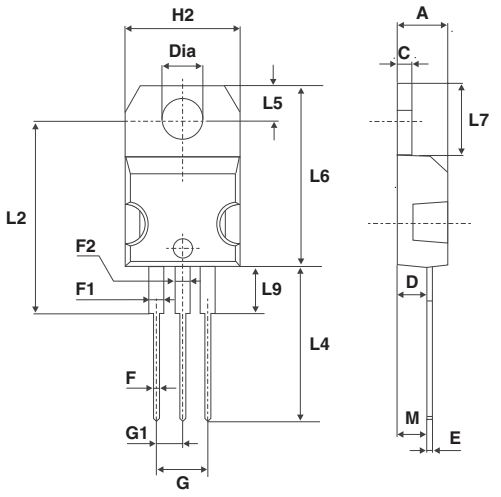
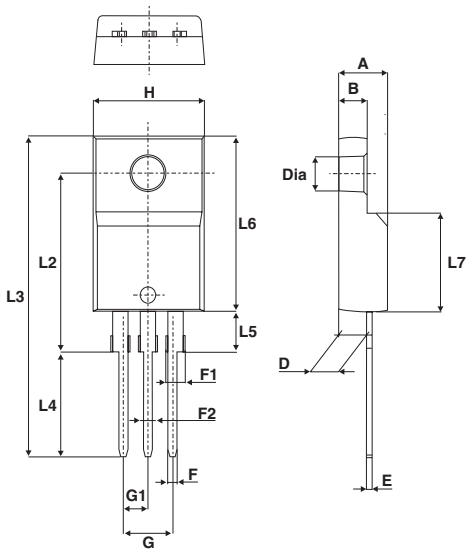


Table 8. TO-220AB dimensions



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
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	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.	3.75	3.85	0.147	0.151

Table 9. TO-220FPAB 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	1.5	0.045	0.059
F2	1.15	1.5	0.045	0.059
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

3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH2002CT	STTH2002CT	TO-220AB	2.23 g	50	Tube
STTH2002CG	STTH2002CG	D^2PAK	1.48 g	50	Tube
STTH2002CG-TR	STTH2002CG	D^2PAK	1.48 g	1000	Tape and reel
STTH2002CR	STTH2002CR	I^2PAK	1.49 g	50	Tube
STTH2002CFP	STTH2002CFP	TO-220AB	1.70 g	50	Tube

4 Revision history

Table 11. Document revision history

Date	Revision	Changes
Feb-2004	1	First issue.
23-Jun-2010	2	Updated *Table 1.* Updated ECOPACK statement.

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