STPS30150C

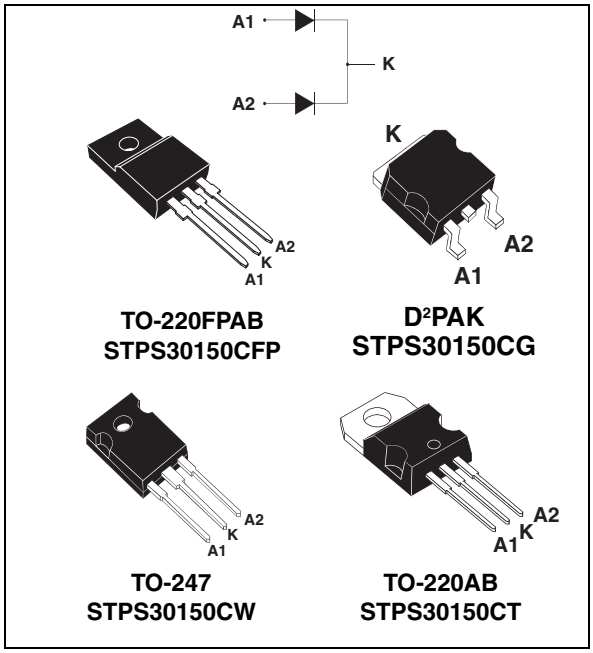
High voltage power Schottky rectifier

Features

- high junction temperature capability
- good trade-off between leakage
- current and forward voltage drop
- low leakage current
- insulated package: TO-220FPAB
  - insulating voltage = 2000 V DC
  - capacitance = 45 pF
- avalanche capability specified

Description

Dual center tap Schottky rectifier designed for high frequency switched mode power supplies.



TO-220FPAB
STPS30150CFP

D²PAK
STPS30150CG

TO-247
STPS30150CW

TO-220AB
STPS30150CT

Table 1. Device summary

$I_{F(AV)}$	2 x 15 A
V_{RRM}	150 V
T_j (max)	175 °C
V_F(max)	0.75 V

1 Characteristics

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

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				150	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220FPAB	T_c =120 °C	Per diode	15	A
		TO-220AB TO-247/D^2PAK	T_c = 155 °C	Per device	30	
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal		220	A
P_{ARM}	Repetitive peak avalanche power		t_p = 1 µs T_j = 25 °C		10500	W
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature (1)				175	°C
dV/dt	Critical rate of rise of reverse voltage				10000	V/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances

Symbol	Parameter			Value	Unit
$R_{th\ (j-c)}$	Junction to case	TO-220FPAB	Per diode	4	°C/W
			Total	3.3	
		TO-220AB/D^2PAK	Per diode	1.6	
			Total	0.85	
		TO-247	Per diode	1.5	
			Total	0.8	
$R_{th\ (c)}$	Coupling	TO-220FPAB		2.6	
		TO-220AB/D^2PAK/TO-247		0.1	

When the diodes 1 and 2 are used simultaneously :
ΔTj(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

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	$V_R = V_{RRM}$			6.5	µA
		T_j = 125 °C				8	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 15 A			0.92	V
		T_j = 125 °C	I_F = 15 A		0.69	0.75	
		T_j = 25 °C	I_F = 30 A			1	
		T_j = 125 °C	I_F = 30 A		0.8	0.86	

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

To evaluate the conduction losses use the following equation:
$P = 0.64 \times I_{F(AV)} + 0.0073\ I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current (per diode)

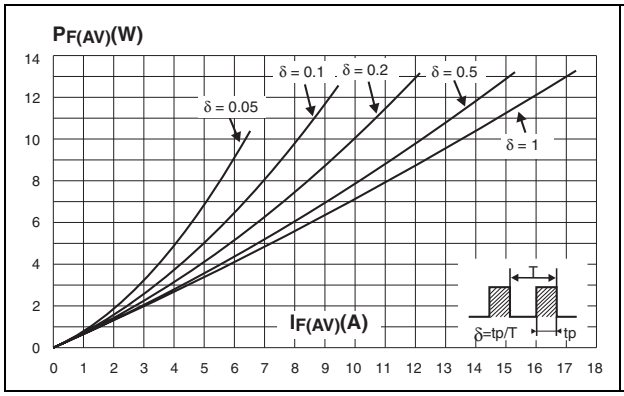


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

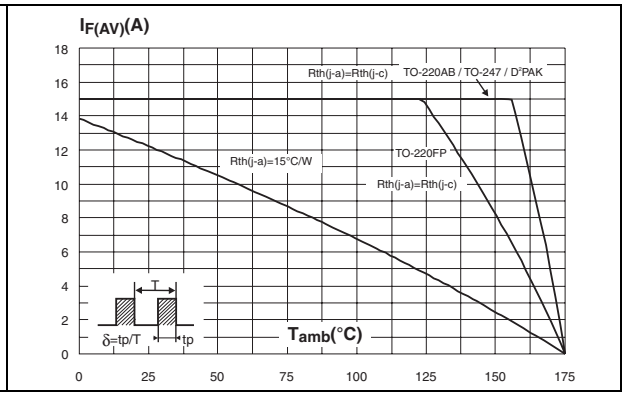


Figure 3. Normalized avalanche power derating versus pulse duration

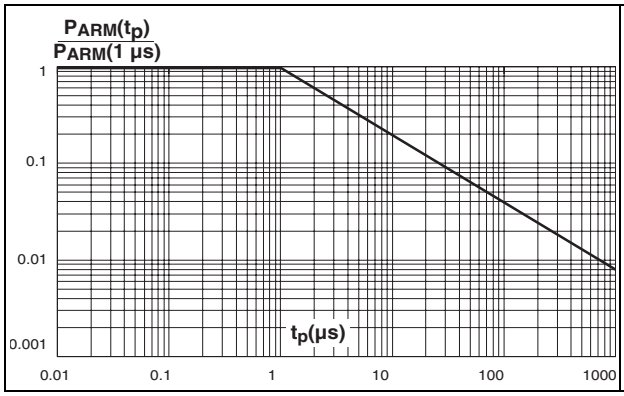


Figure 4. Normalized avalanche power derating versus junction temperature

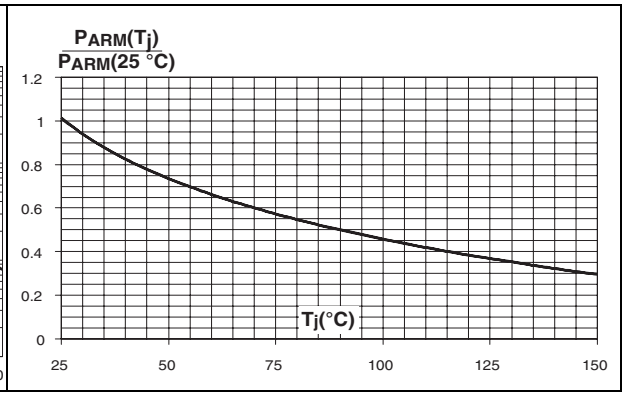


Figure 5. Non repetitive surge peak forward current vs. overload duration (max. values, per diode)

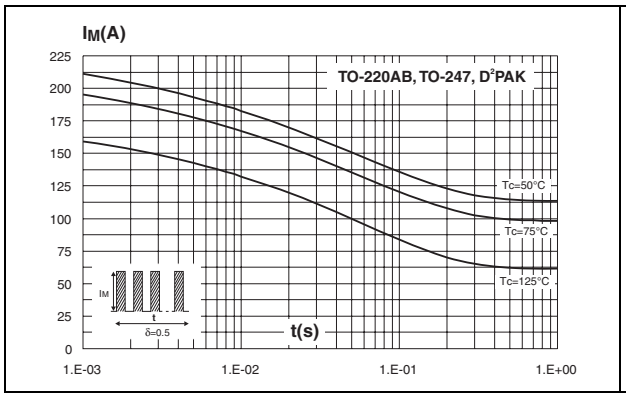


Figure 6. Non repetitive surge peak forward current vs. overload duration (max. values, per diode) (TO-220FPAB)

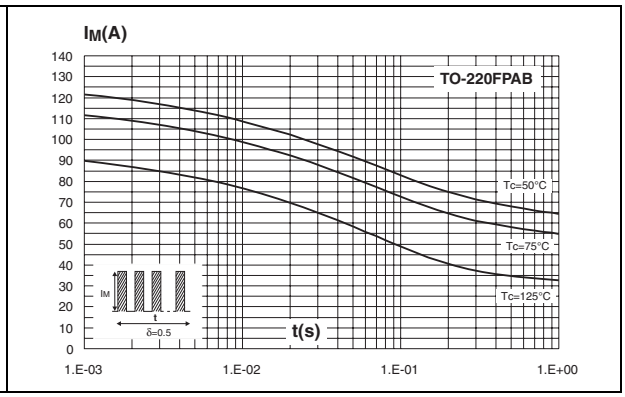


Figure 7. Variation of thermal impedance junction to case versus pulse duration (per diode)

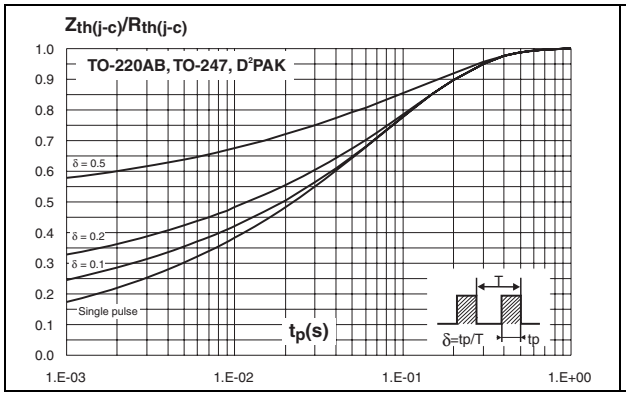


Figure 8. Variation of thermal impedance junction to case versus pulse duration (per diode) (TO-220FPAB)

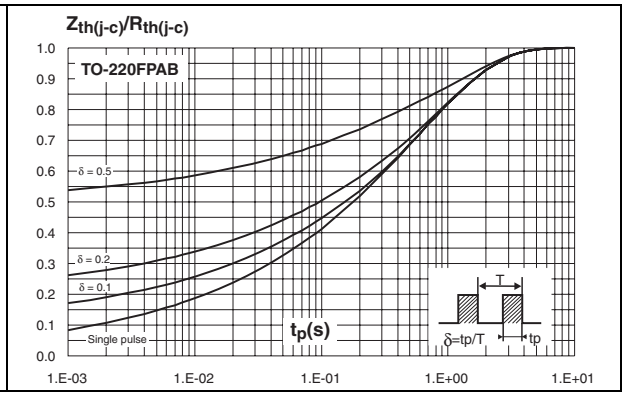


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

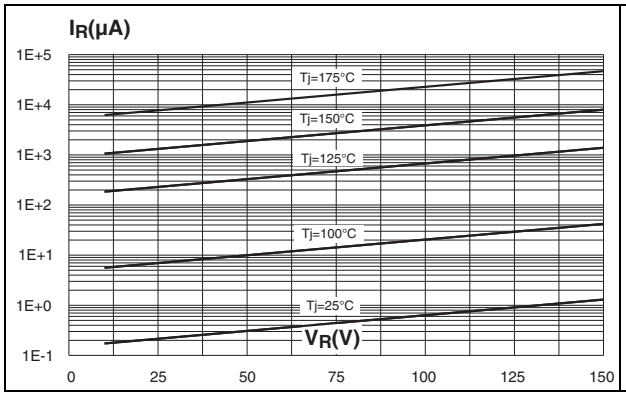


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

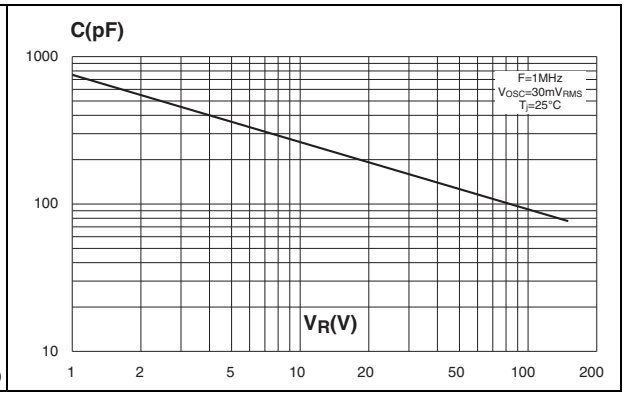


Figure 11. Forward voltage drop versus forward current (maximum values, per diode)

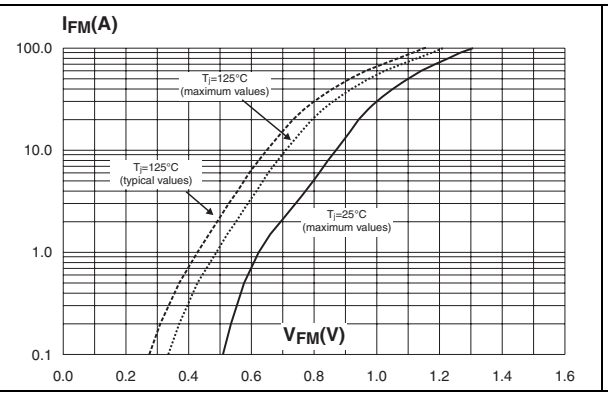
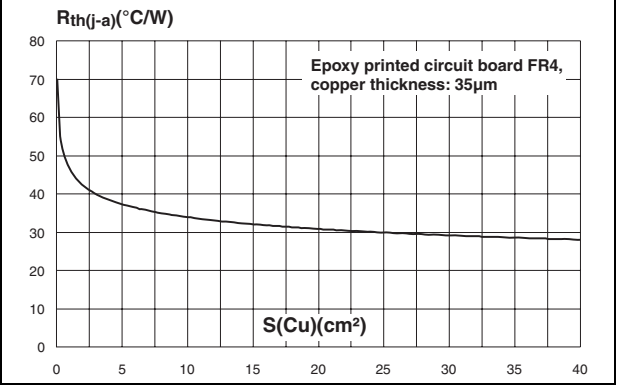


Figure 12. Thermal resistance junction to ambient versus copper surface under tab for D^2PAK



2 Package Information

- Epoxy meets UL94, V0
- Cooling method: (C) conduction
- Recommended torque values (TO-220FPAB, TO-220AB: 0.4 to 0.6 N·m
- Torque values (TO-247): 0.55 N·m recommended, 1.0 N·m maximum

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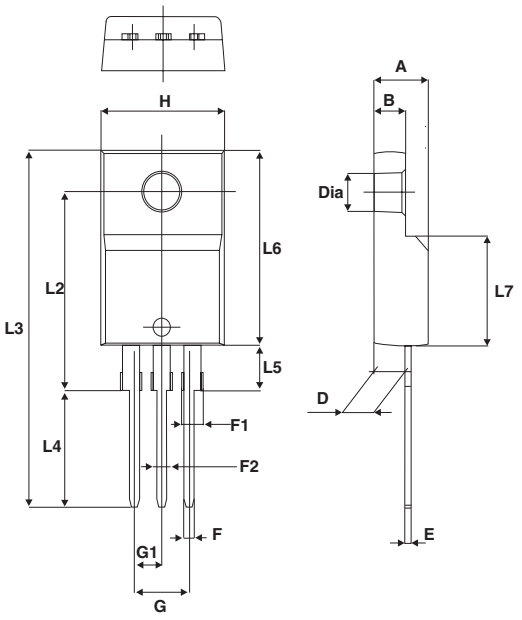
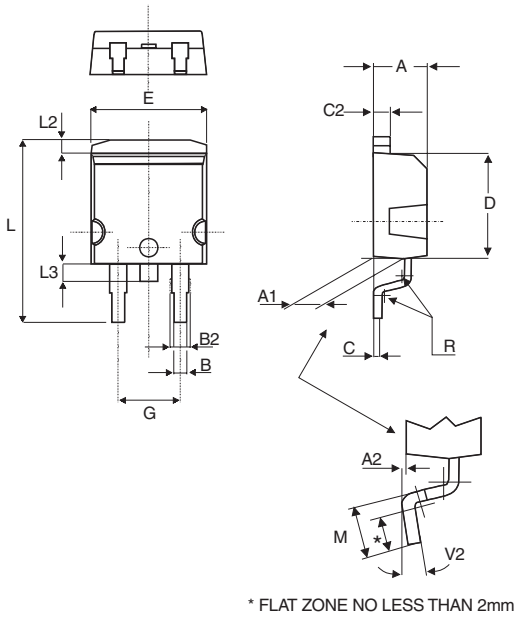
Table 5. TO-220FPAB package dimensions



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
F2	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 6. D²PAK package 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 13. Footprint dimensions (in millimeters)

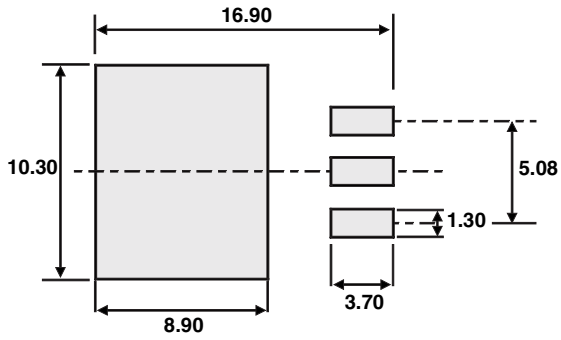
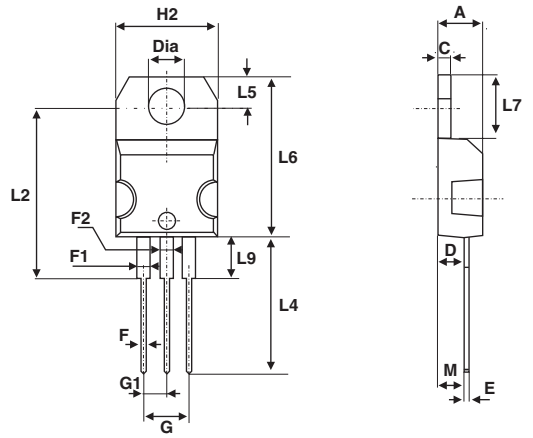
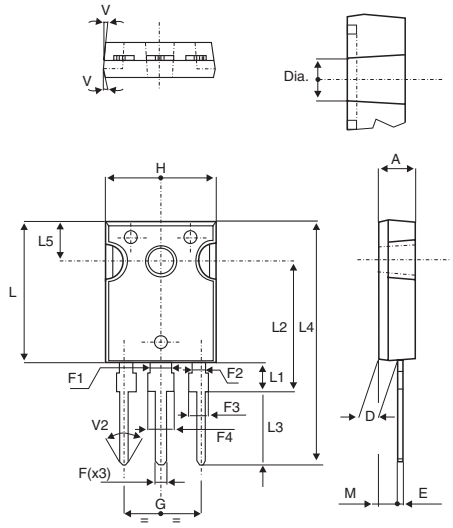


Table 7. TO-220AB package dimensions



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	0.067
F2	1.14	1.70	0.044	0.067
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 8. TO-247 package 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
F1		3.00			0.118	
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
F4	3.00		3.40	0.118		0.133
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

3 Ordering Information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30150CT	STPS30150CT	TO-220AB	2 g	50	Tube
STPS30150CFP	STPS30150CFP	TO-220FPAB	1.9 g	50	Tube
STPS30150CW	STPS30150CW	TO-247	4.4 g	30	Tube
STPS30150CG	STPS30150CG	D^2PAK	1.48 g	50	Tube
STPS30150CG-TR	STPS30150CG	D^2PAK	1.48 g	1000	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
Feb-2004	7	Previous release.
26-Nov-2010	8	Added ECOPACK statement. Corrected package name in *Figure 12*.

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