STPS20150C

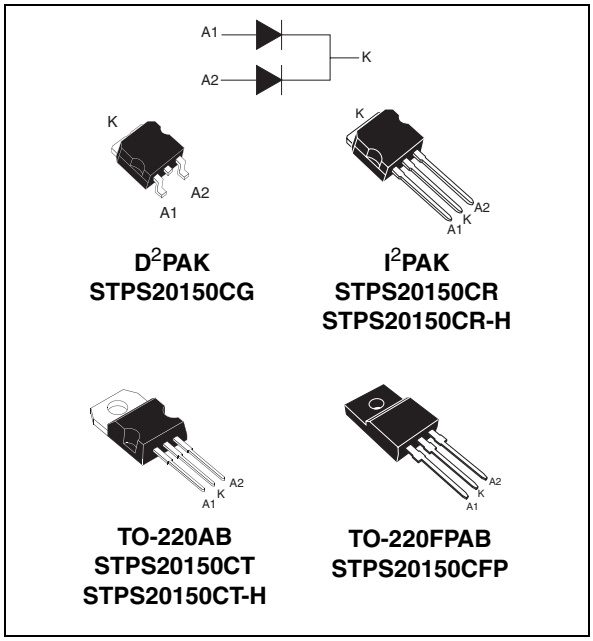
High voltage power Schottky rectifier

Features

- HIgh junction temperature capability
- Good trade off between leakage current and forward voltage drop
- Low leakage current
- Avalanche capability specified
- Insulated package TO-220FPAB:
  - Insulating voltage = 2000 V
  - Typical package capacitance 12 pF

Description

Dual center tap Schottky rectifier designed for high frequency Switched Mode Power Supplies.



D^2PAK
STPS20150CG

I^2PAK
STPS20150CR
STPS20150CR-H

TO-220AB
STPS20150CT
STPS20150CT-H

TO-220FPAB
STPS20150CFP

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
V_{RRM}	150 V
T_j	175 °C
V_F(max)	0.75 V

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				150	V
$I_{F(RMS)}$	Forward rms voltage				30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB I^2PAK, D^2PAK	T_c = 155 °C	Per diode	10	A
		TO-220FPAB	T_c = 135 °C	Per device	20	
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal		180	A
P_{ARM}	Repetitive peak avalanche power		t_p = 1 µs T_j = 25 °C		6700	W
T_{stg}	Storage temperature range				- 65 to + 150	°C
T_j	Maximum operating junction temperature(1)				175	°C

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

Table 3. Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, D^2PAK, I^2PAK	Per diode	2.2	°C/W
		TO-220FPAB		4.5	
		TO-220AB, D^2PAK, I^2PAK	Total	1.3	
		TO-220FPAB		3.5	
$R_{th(c)}$	Coupling	TO-220AB, D^2PAK, I^2PAK		0.3	
		TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode 1) x $R_{th(j-l)}$(Per diode) + P(diode 2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			5.0	µA
		T_j = 125 °C				5.0	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A			0.92	V
		T_j = 125 °C			0.69	0.75	
		T_j = 25 °C	I_F = 20 A			1	
		T_j = 125 °C			0.79	0.86	

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

To evaluate the conduction losses use the following equation:

$P = 0.64 \times I_{F(AV)} + 0.011\ I_F{}^2{}_{(RMS)}$

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

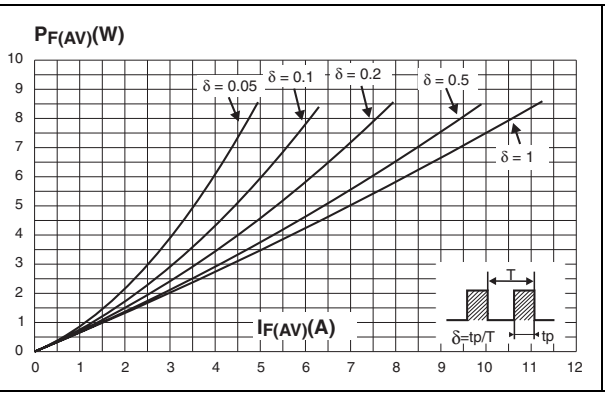


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

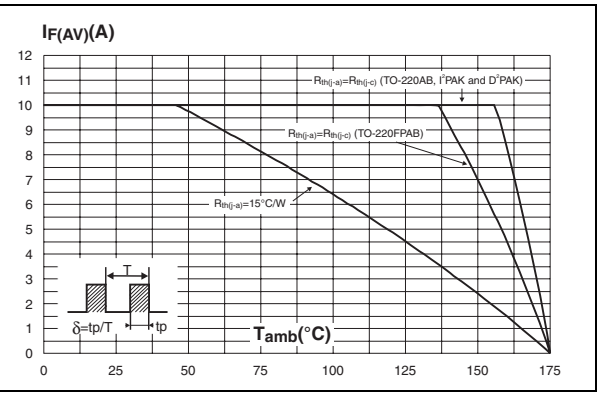


Figure 3. Normalized avalanche power derating versus pulse duration

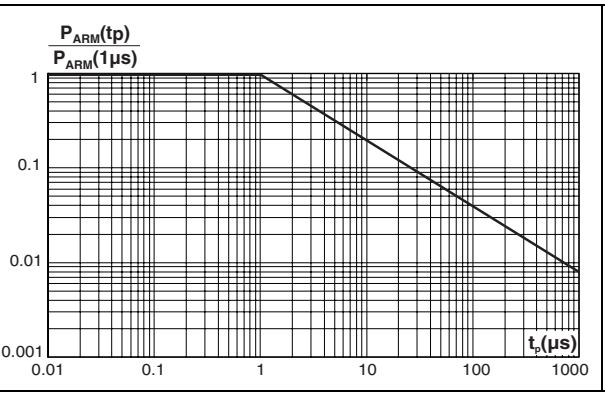


Figure 4. Normalized avalanche power derating versus junction temperature

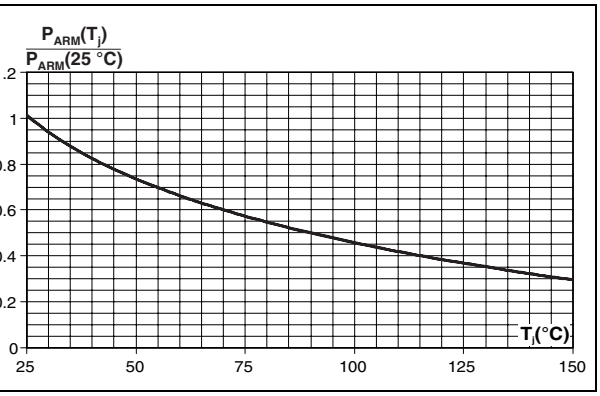


Figure 5. Non repetitive surge peak forward current versus overload duration

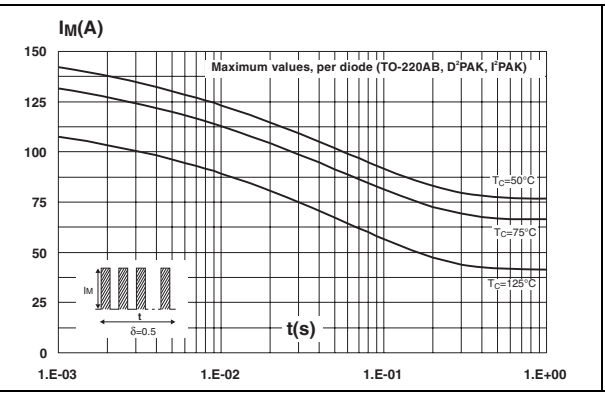


Figure 6. Non repetitive surge peak forward current versus overload duration

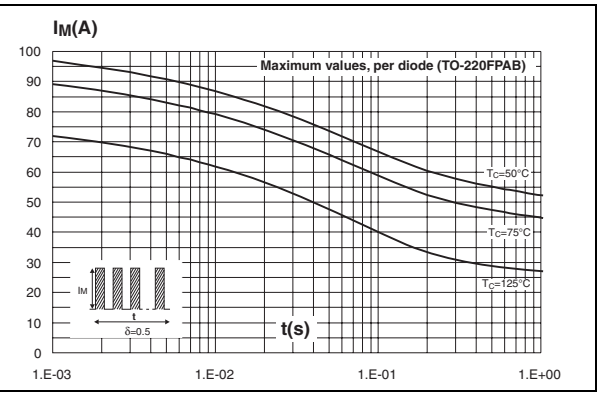


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration

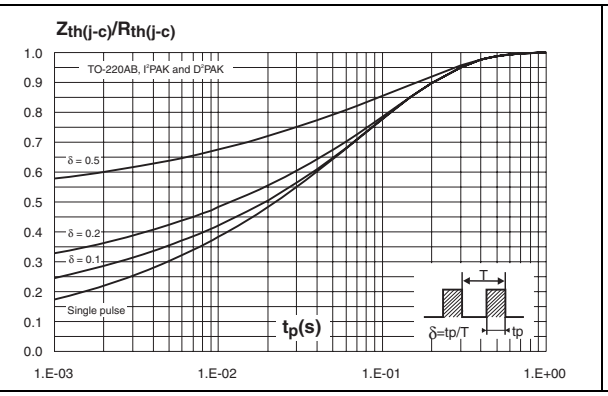


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

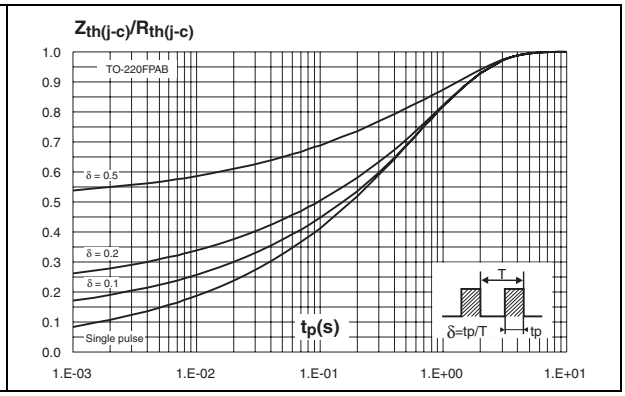


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

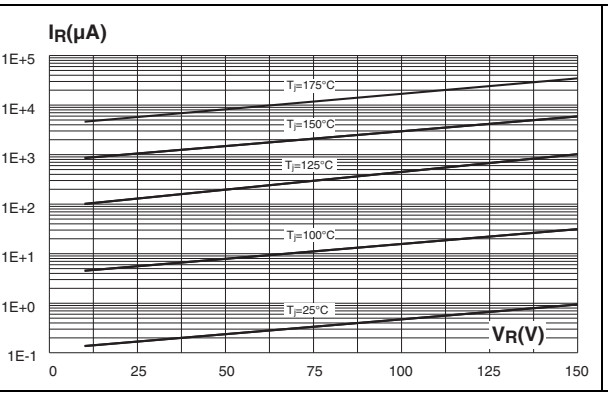


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

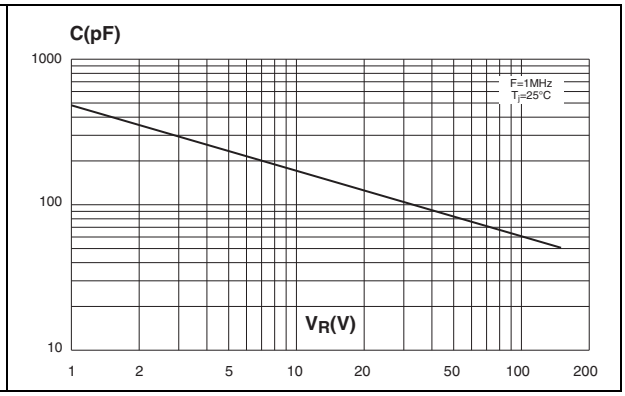


Figure 11. Forward voltage drop versus forward current (per diode)

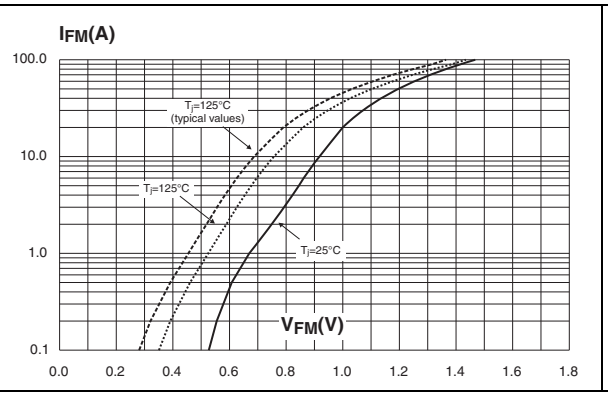
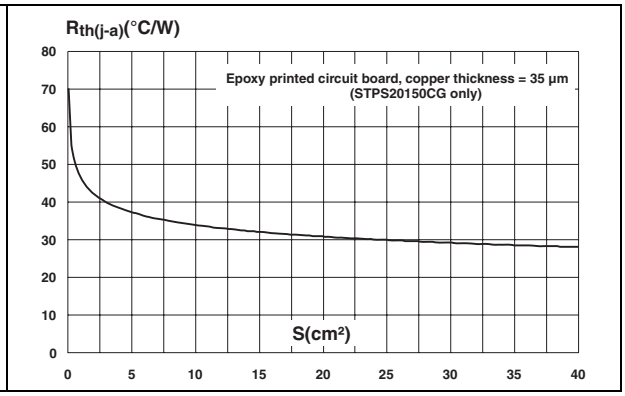


Figure 12. Thermal resistance junction to ambient versus copper surface under tab

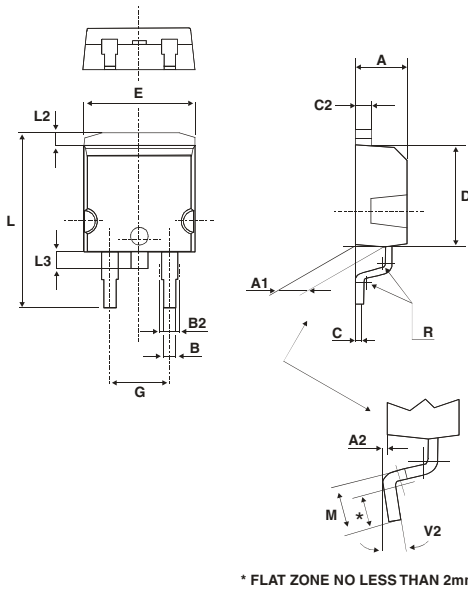


2 Package information

- Epoxy meets UL94,V0
- Lead-free package

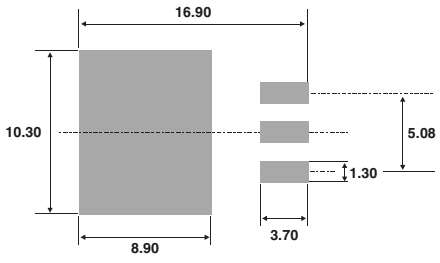
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 5. D²PAK dimensions



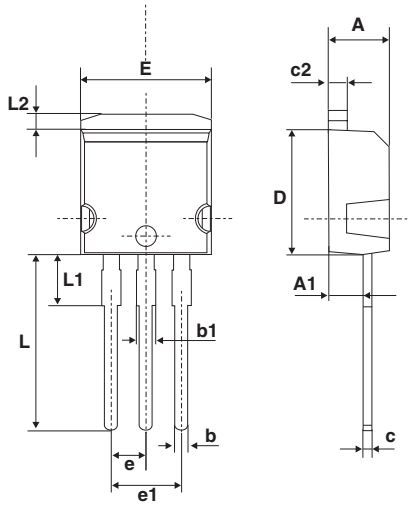
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	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 13. Footprint (dimensions in mm)



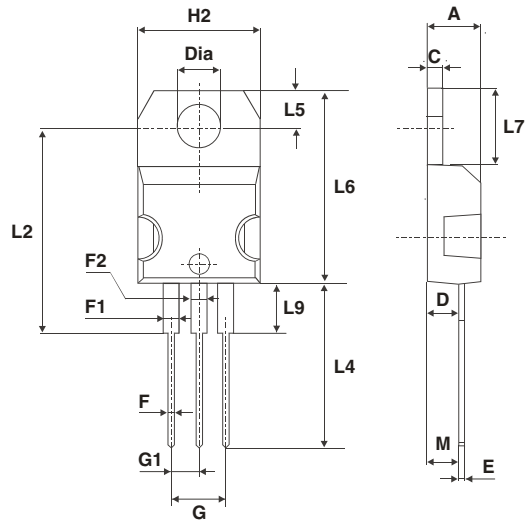
Devices in I²PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

Table 6. I²PAK dimensions



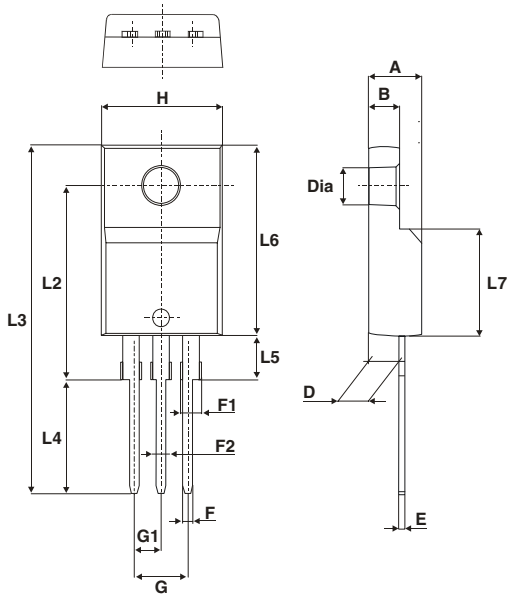
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
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. 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 8. 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	1.50	0.045	0.059
F2	1.15	1.50	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 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS20150CT	STPS20150CT	TO-220AB	2.23 g	50	Tube
STPS20150CT-H	STPS20150CT	TO-220AB	2.23 g	50	Tube
STPS20150CG	STPS20150CG	D^2PAK	1.48 g	50	Tube
STPS20150CG-TR	STPS20150CG	D^2PAK	1.48 g	1000	Tape and reel
STPS20150CR	STPS20150CR	I^2PAK	1.49 g	50	Tube
STPS20150CR-H	STPS20150CR	I^2PAK	1.49 g	50	Tube
STPS20150CFP	STPS20150CFP	TO-220FPAB	2.0 g	50	Tube

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
Jul-2003	6D	Last update.
31-May-2006	7	Reformatted to current standard. Added ECOPACK statement. Changed nF to pF in Figure 10.
07-Mar-2007	8	Reworded footnote to Table 1. Corrected typing error in Table 3.
28-Jan-2011	9	Updated weight in *Table 9.* Added warning paragraph above *Table 6*.

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