

HIGH VOLTAGE POWER SCHOTTKY RECTIFIER

Table 1: Main Product Characteristics

$I_{F(AV)}$	2 x 10 A
V_{RRM}	170 V
T_j	175°C
$V_F(max)$	0.75 V

Features

- High reverse voltage
- High junction temperature capability
- Avalanche specification with derating curves

Benefits

- Can challenge bipolar ultrafast diodes with better dynamic characteristics.

Description

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

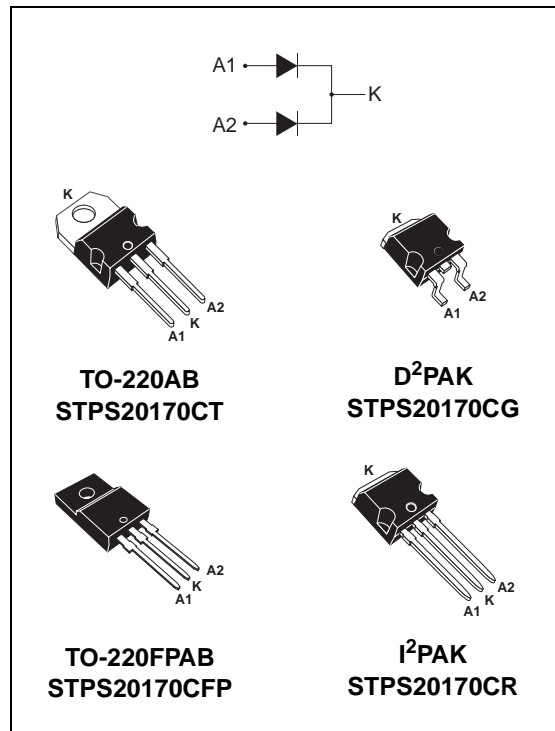


Table 2: Order Codes

Part Numbers	Marking
STPS20170CT	STPS20170CT
STPS20170CFP	STPS20170CFP
STPS20170CR	STPS20170CR
STPS20170CG	STPS20170CG
STPS20170CG-TR	STPS20170CG

STPS20170C

Table 3: Absolute Ratings (limiting values, per diode)

Symbol	Parameter			Value	Unit	
V_{RRM}	Repetitive peak reverse voltage			170	V	
$I_{F(RMS)}$	RMS forward voltage			30	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / D ² PAK / I ² PAK	$T_c = 155^\circ\text{C}$	Per diode Per device	10 20	A
		TO-220FPAB	$T_c = 135^\circ\text{C}$	Per diode Per device	10 20	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ms}$ sinusoidal	180	A	
P_{ARM}	Repetitive peak avalanche power		$t_p = 1\mu\text{s}$ $T_j = 25^\circ\text{C}$	6700	W	
T_{stg}	Storage temperature range			-65 to + 175	$^\circ\text{C}$	
T_j	Maximum operating junction temperature *			175	$^\circ\text{C}$	
dV/dt	Critical rate of rise of reverse voltage			10000	V/ μs	

* : $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ thermal runaway condition for a diode on its own heatsink

Table 4: Thermal Parameters

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

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode } 2) \times R_{th(c)}$$

Table 5: Static Electrical Characteristics (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ	Max.	Unit
I_R *	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			15	μA
		$T_j = 125^\circ\text{C}$				15	mA
V_F **	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 10\text{A}$			0.90	V
		$T_j = 125^\circ\text{C}$			0.69	0.75	
		$T_j = 25^\circ\text{C}$	$I_F = 20\text{A}$			0.99	
		$T_j = 125^\circ\text{C}$			0.79	0.86	

Pulse test: * $t_p = 5\text{ ms}$, $\delta < 2\%$

** $t_p = 380\ \mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation: $P = 0.64 \times I_{F(AV)} + 0.011 I_{F(RMS)}^2$

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

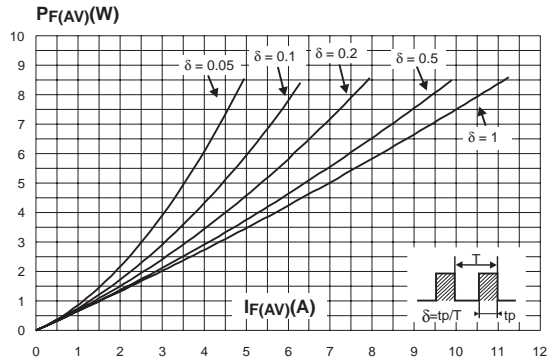


Figure 2: Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

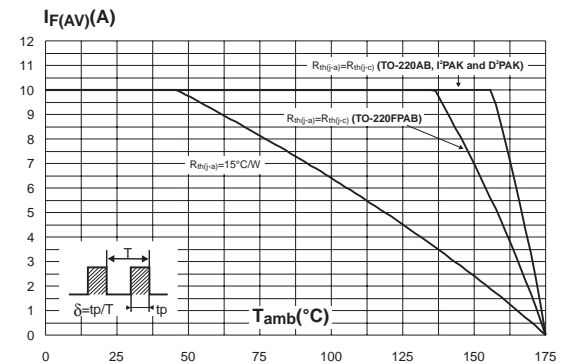


Figure 3: Normalized avalanche power derating versus pulse duration

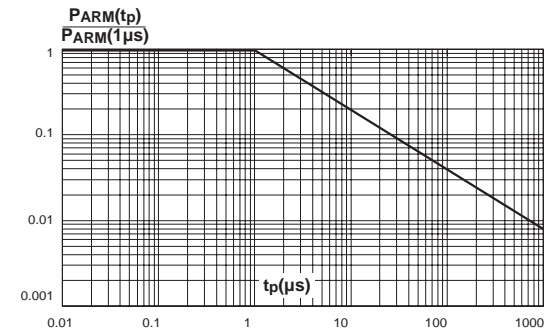


Figure 4: Normalized avalanche power derating versus junction temperature

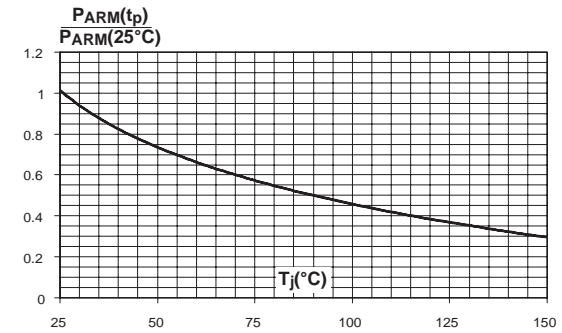


Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, D²PAK, I²PAK)

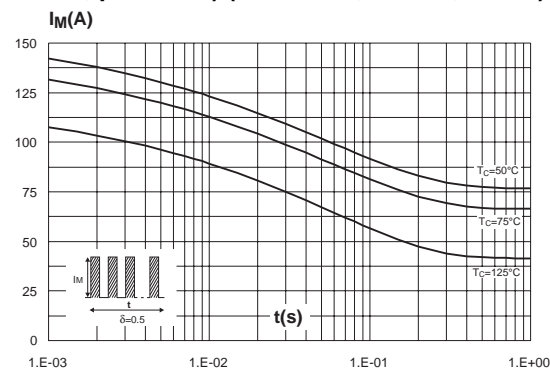


Figure 6: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)

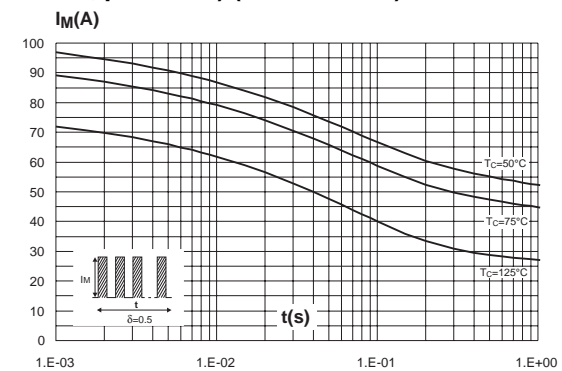


Figure 7: Relative variation of thermal impedance junction to case versus pulse duration

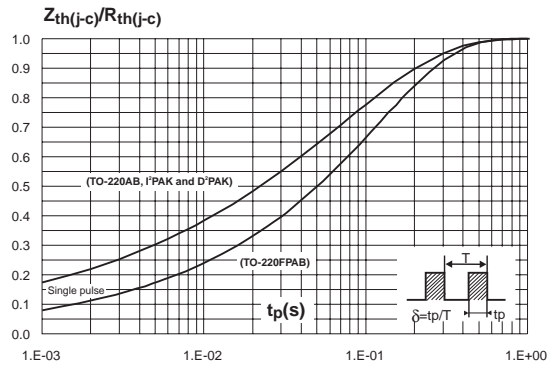


Figure 8: Reverse leakage current versus reverse voltage applied (typical values, per diode)

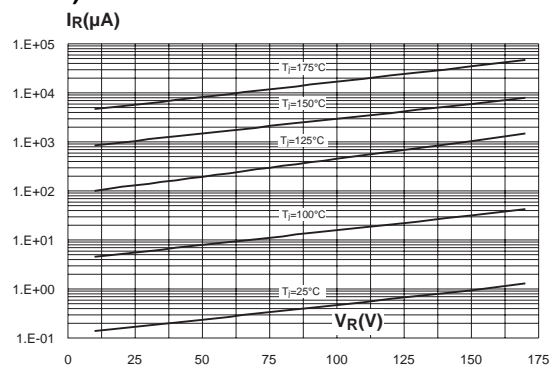


Figure 9: Junction capacitance versus reverse voltage applied (typical values, per diode)

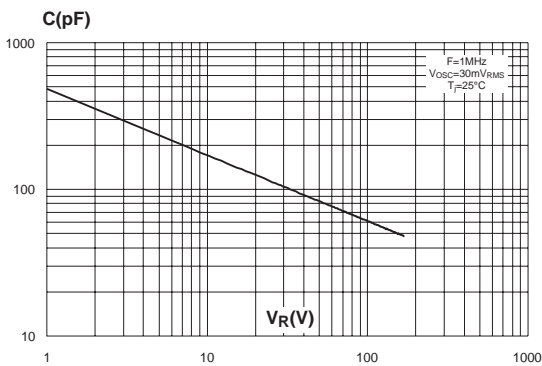


Figure 10: Forward voltage drop versus forward current (per diode)

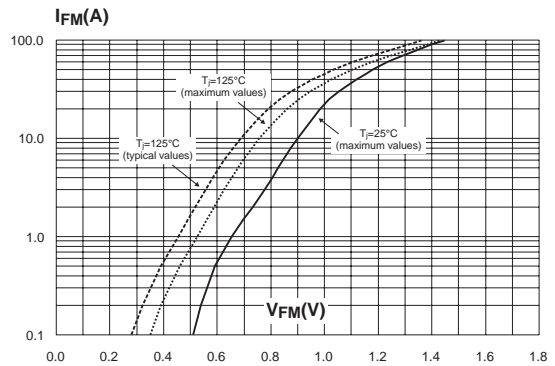


Figure 11: Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, Cu = 35 μm) (D²PAK)

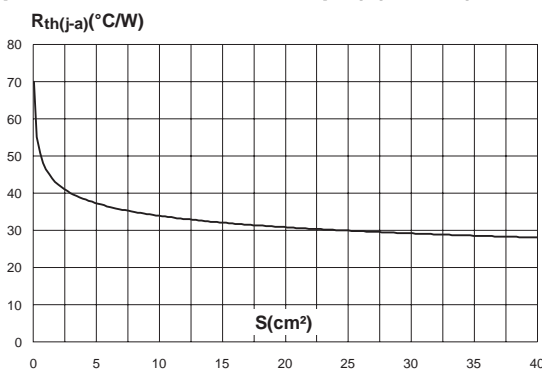


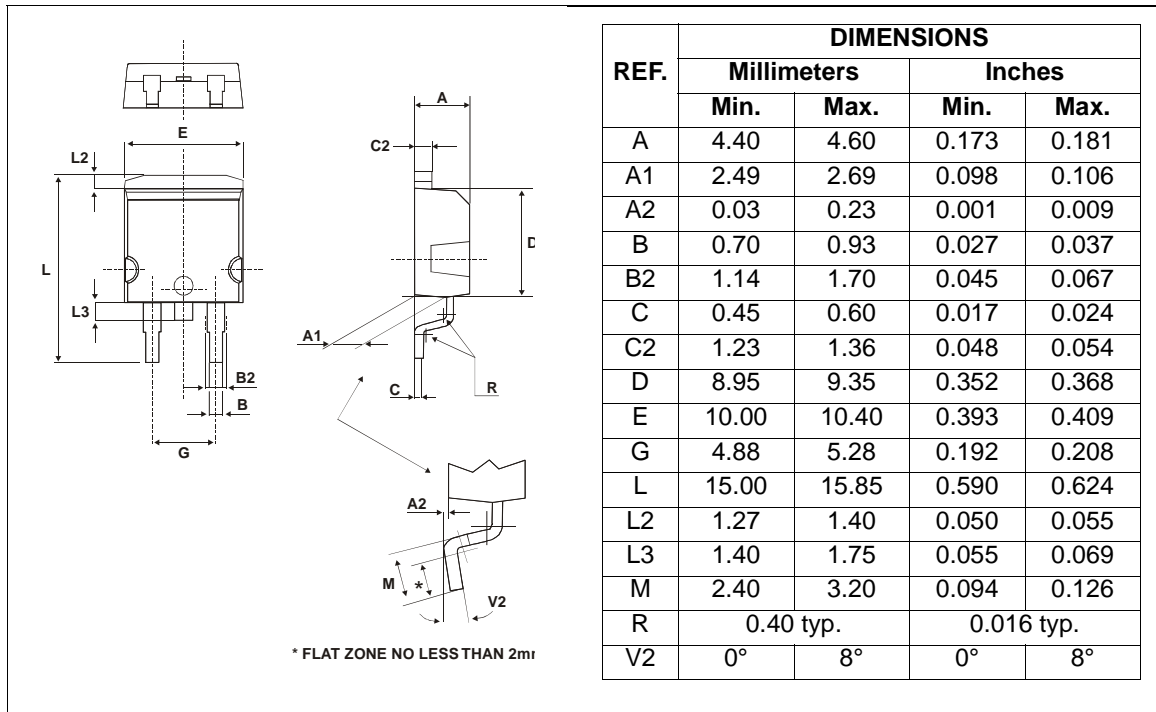
Figure 12: D²PAK Package Mechanical Data

Figure 13: Foot Print Dimensions (in millimeters)

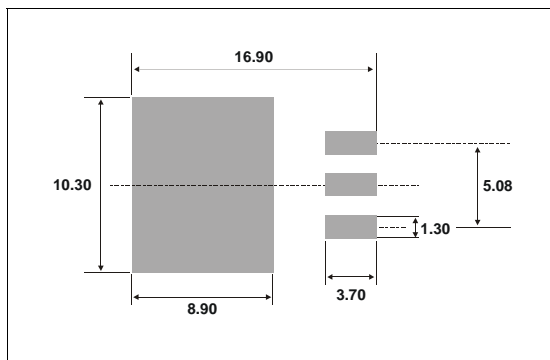


Figure 14: I²PAK Package Mechanical Data

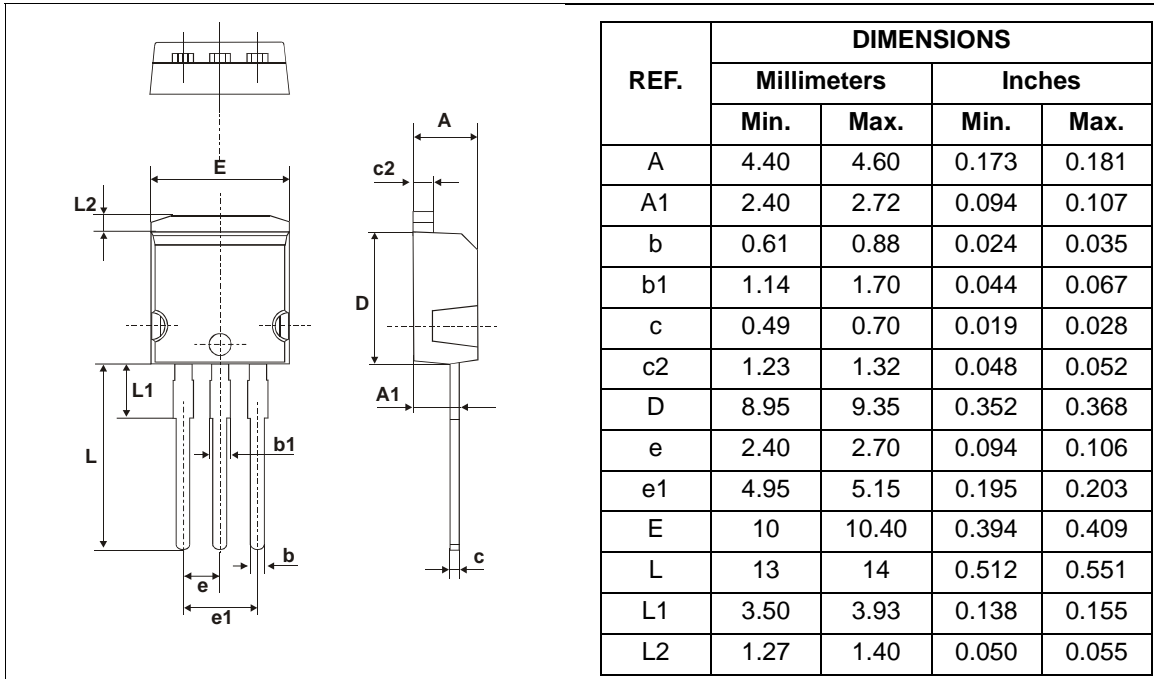


Figure 15: TO-220FPAB Package Mechanical Data

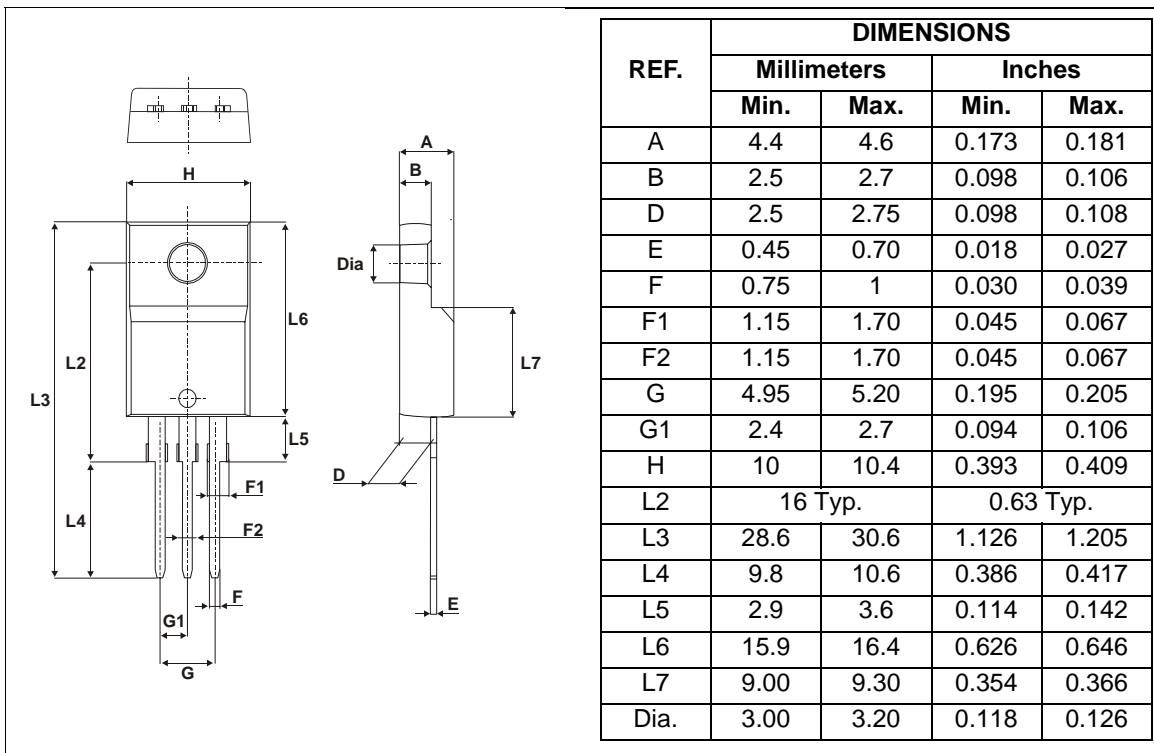


Figure 16: TO-220AB Package Mechanical Data

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 6: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS20170CT	STPS20170CT	TO-220AB	2.20 g	50	Tube
STPS20170CFP	STPS20170CFP	TO-220FPAB	2 g	50	Tube
STPS20170CR	STPS20170CR	I ² PAK	1.49 g	50	Tube
STPS20170CG	STPS20170CG	D ² PAK	1.48 g	50	Tube
STPS20170CG-TR	STPS20170CG			1000	Tape & reel

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N.
- Maximum torque value: 1.0 m.N.

Table 7: Revision History

Date	Revision	Description of Changes
Mar-2004	1	First issue.
28-Jul-2005	2	TO-220FPAB, I ² PAK and D ² PAK packages added.

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