

## 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
$V_F(\text{max})$	0.75 V

### Features

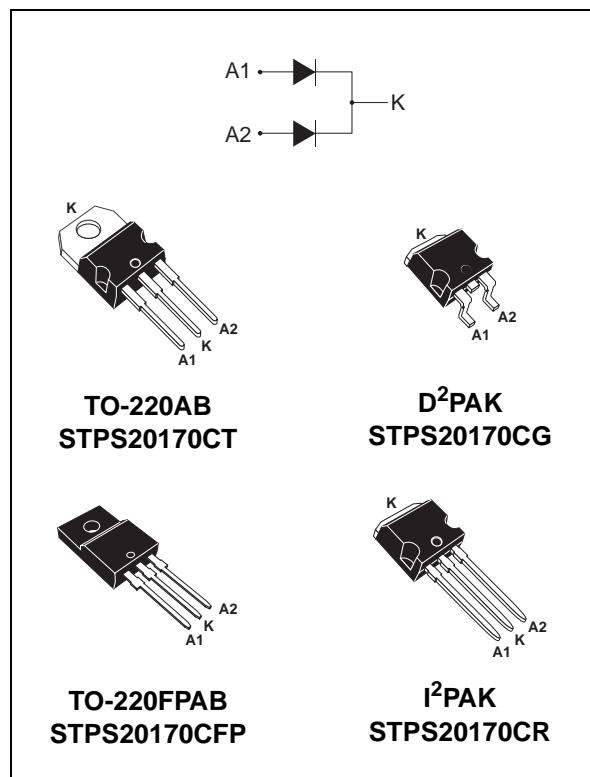
- High reverse voltage
- High junction temperature capability
- Avalanche specification with derating curves

### 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 <sub>RRM</sub>	Repetitive peak reverse voltage				170	V
I <sub>F(RMS)</sub>	RMS forward voltage				30	A
I <sub>F(AV)</sub>	Average forward current $\delta = 0.5$	TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK	T <sub>c</sub> = 155°C	Per diode	10	A
		TO-220FPAB	T <sub>c</sub> = 135°C	Per device	20	
I <sub>FSM</sub>	Surge non repetitive forward current		t <sub>p</sub> = 10ms sinusoidal		180	A
P <sub>ARM</sub>	Repetitive peak avalanche power		t <sub>p</sub> = 1μs T <sub>j</sub> = 25°C		6700	W
T <sub>stg</sub>	Storage temperature range				-65 to + 175	°C
T <sub>j</sub>	Maximum operating junction temperature *				175	°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 <sub>th(j-c)</sub>	Junction to case	TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK		Per diode	2.2	°C/W
		TO-220FPAB		Total	1.3	
		TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK		Per diode	4.5	
		TO-220FPAB		Total	3.5	
R <sub>th(c)</sub>		TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK		Coupling	0.3	
		TO-220FPAB			2.5	

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)

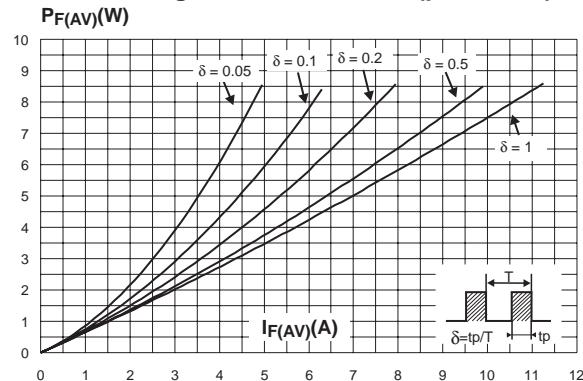
Symbol	Parameter	Tests conditions		Min.	Typ	Max.	Unit
I <sub>R</sub> *	Reverse leakage current	T <sub>j</sub> = 25°C	V <sub>R</sub> = V <sub>RRM</sub>			15	μA
		T <sub>j</sub> = 125°C				15	mA
V <sub>F</sub> **	Forward voltage drop	T <sub>j</sub> = 25°C	I <sub>F</sub> = 10A			0.90	V
		T <sub>j</sub> = 125°C			0.69	0.75	
		T <sub>j</sub> = 25°C	I <sub>F</sub> = 20A			0.99	
		T <sub>j</sub> = 125°C			0.79	0.86	

Pulse test: \* tp = 5 ms, δ < 2%

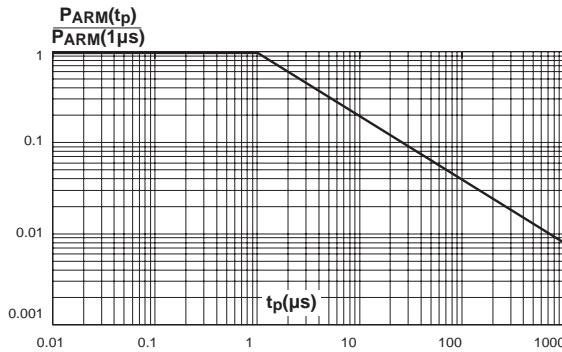
\*\* tp = 380 μs, δ < 2%

To evaluate the conduction losses use the following equation: P = 0.64 × I<sub>F(AV)</sub> + 0.011 I<sub>F</sub><sup>2</sup> (RMS)

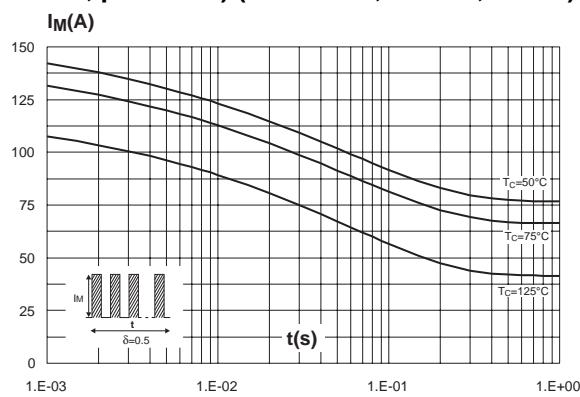
**Figure 1: Average forward power dissipation versus average forward current (per diode)**



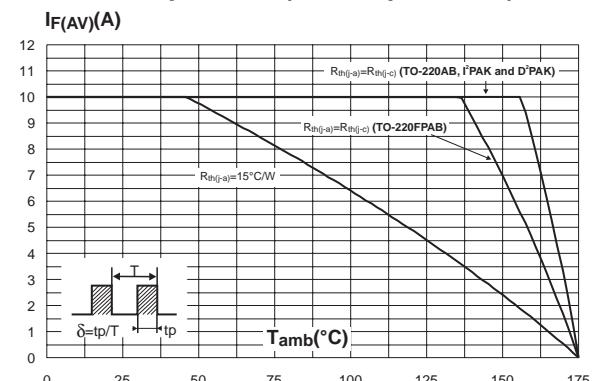
**Figure 3: Normalized avalanche power derating versus pulse duration**



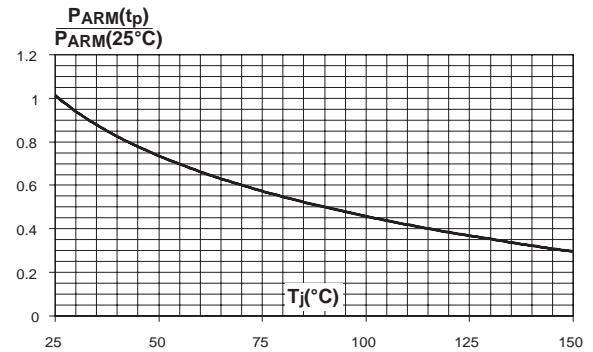
**Figure 5: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, D<sup>2</sup>PAK, I<sup>2</sup>PAK)**



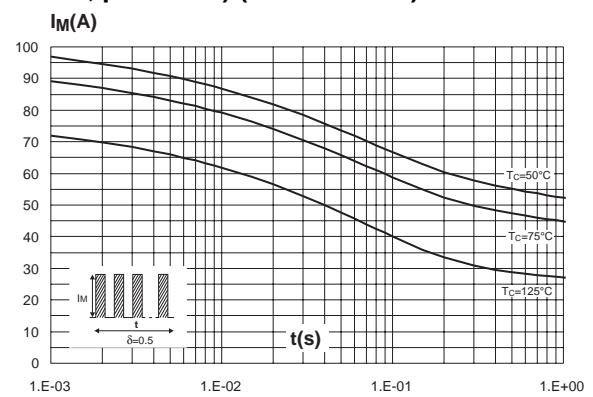
**Figure 2: Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



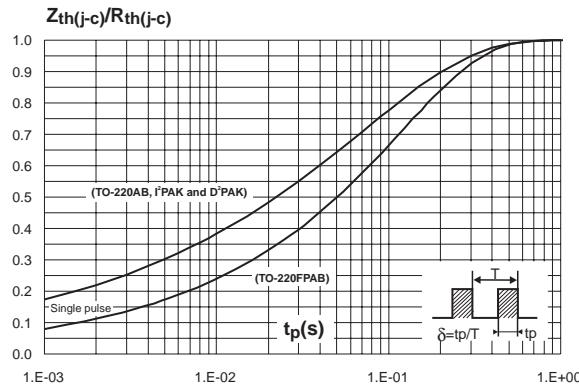
**Figure 4: Normalized avalanche power derating versus junction temperature**



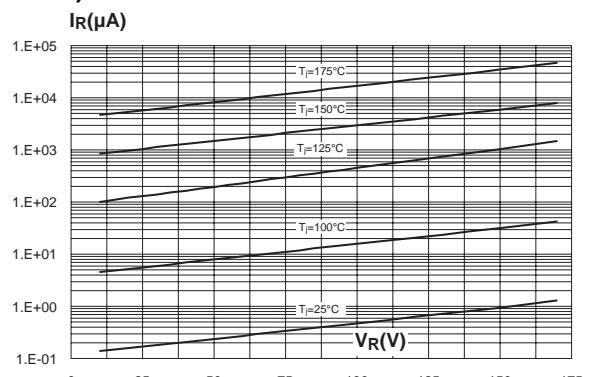
**Figure 6: Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220FPAB)**



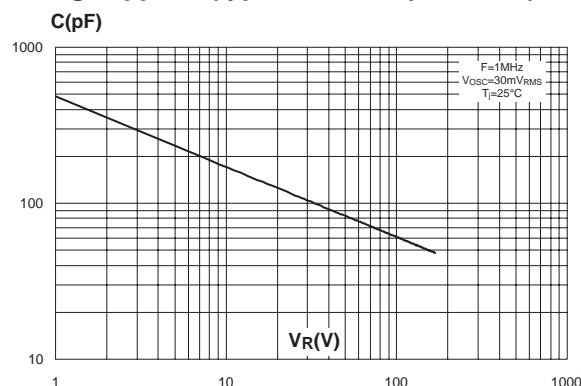
**Figure 7: Relative variation of thermal impedance junction to case versus pulse duration**



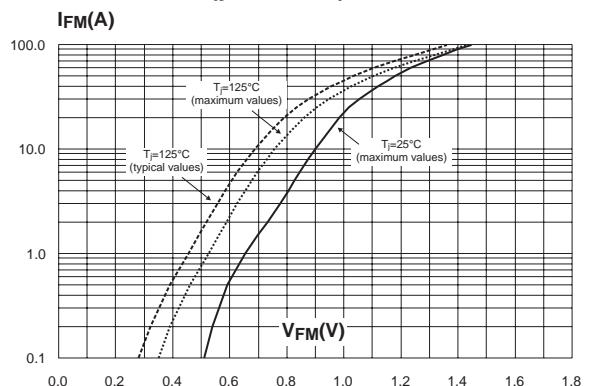
**Figure 8: Reverse leakage current versus reverse voltage applied (typical values, per diode)**



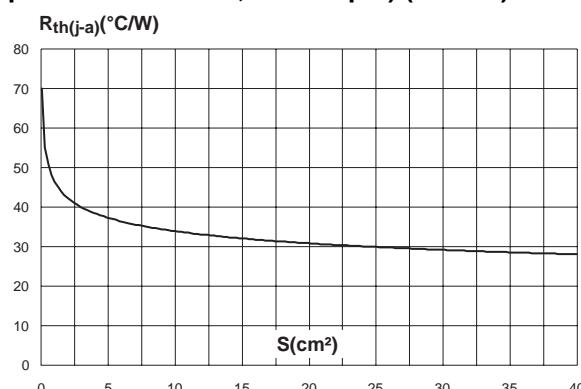
**Figure 9: Junction capacitance versus reverse voltage applied (typical values, per diode)**



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



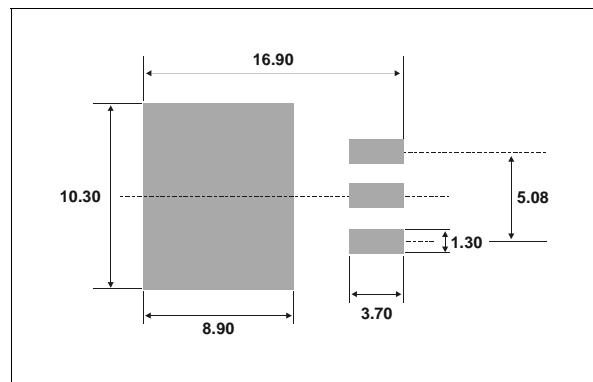
**Figure 11: Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, Cu = 35μm) (D<sup>2</sup>PAK)**



**Figure 12: D<sup>2</sup>PAK Package Mechanical Data**

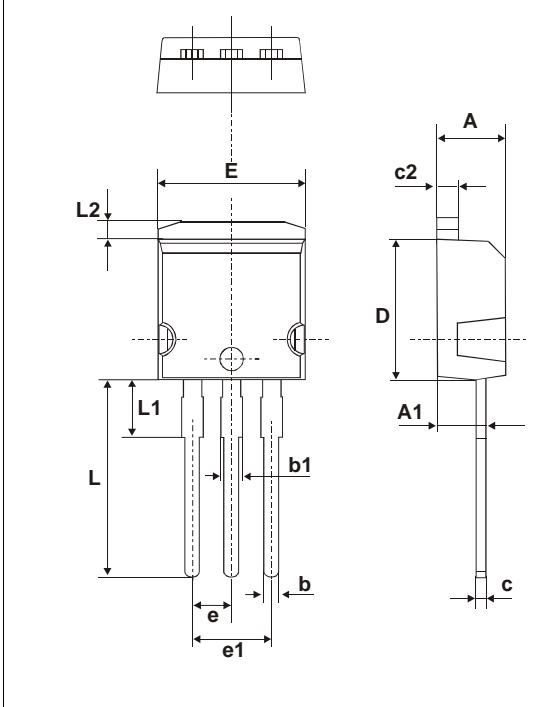
**DIMENSIONS**

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: Foot Print Dimensions (in millimeters)**

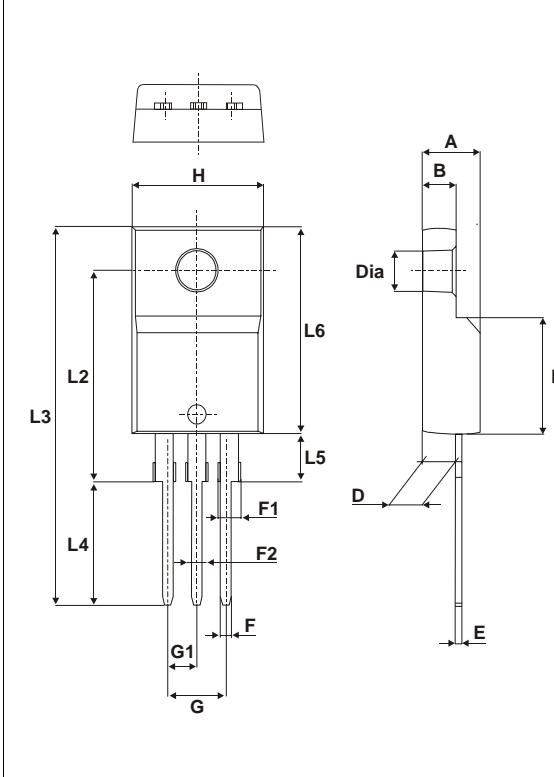
## STPS20170C

Figure 14: I<sup>2</sup>PAK Package Mechanical Data



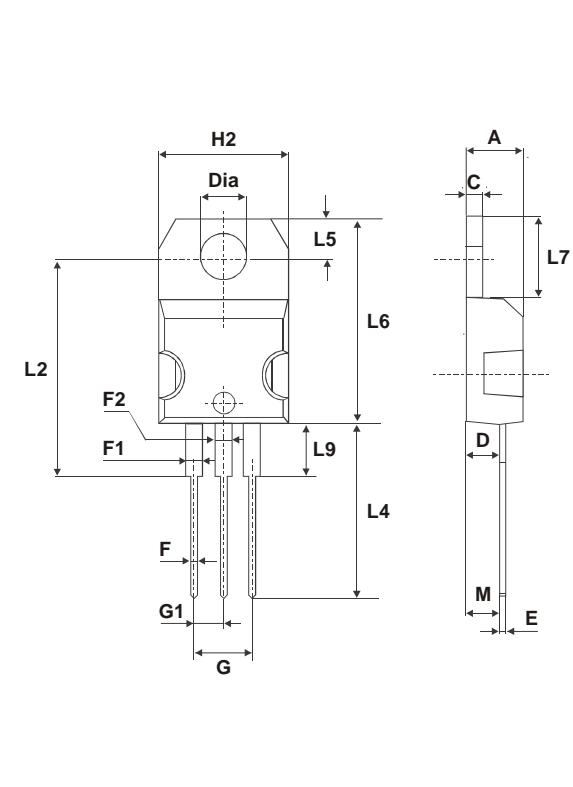
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409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

Figure 15: TO-220FPAB Package Mechanical Data



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

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 <sup>2</sup> PAK	1.49 g	50	Tube
STPS20170CG	STPS20170CG	D <sup>2</sup> 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 <sup>2</sup> PAK and D <sup>2</sup> PAK packages added.

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