

100 V power Schottky rectifier

Features

- Negligible switching losses
- High junction temperature capability
- Good trade off between leakage current and forward voltage drop
- Low leakage current
- Avalanche rated
- 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 miniature switched mode power supplies such as adaptators and on board DC/DC converters.

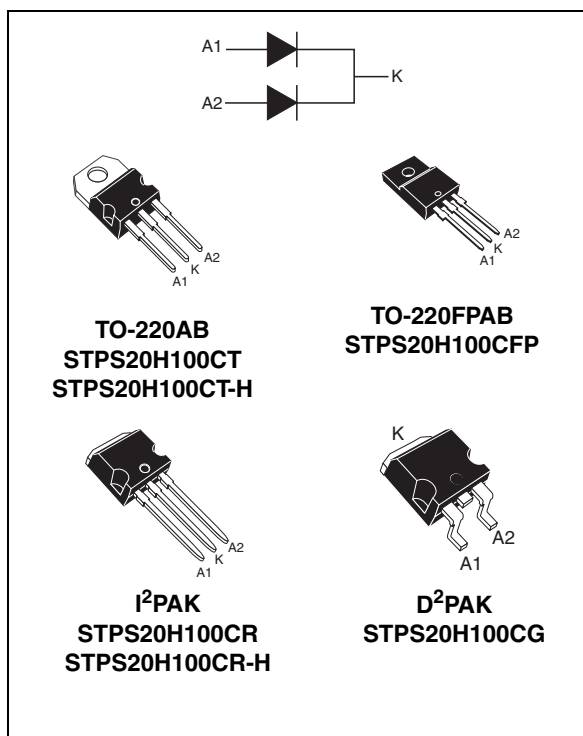


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
V_{RRM}	100 V
T_j (max)	175 °C
V_F (max)	0.64 V

1 Characteristics

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

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				100	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB D ² PAK / I ² PAK	$T_c = 160\text{ }^{\circ}\text{C}$	Per diode	10	A
		TO-220FPAB	$T_c = 145\text{ }^{\circ}\text{C}$	Per device	20	
I_{FSM}	Surge non repetitive forward current			$t_p = 10\text{ ms}$ sinusoidal	250	A
I_{RRM}	Repetitive peak reverse current			$t_p = 2\text{ }\mu\text{s}$ square $F = 1\text{ kHz}$	1	A
I_{RSM}	Non repetitive peak reverse current			$t_p = 100\text{ }\mu\text{s}$ square	3	A
P_{ARM}	Repetitive peak avalanche power			$t_p = 1\text{ }\mu\text{s}$ $T_j = 25\text{ }^{\circ}\text{C}$	10800	W
T_{stg}	Storage temperature range				-65 to + 175	$^{\circ}\text{C}$
T_j	Maximum operating junction temperature ⁽¹⁾				175	$^{\circ}\text{C}$
dV/dt	Critical rate of rise of reverse voltage				10000	V/ μs

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ 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 ² PAK / I ² PAK	Per diode	1.6	$^{\circ}\text{C/W}$
		TO-220FPAB	Per diode	4	
		TO-220AB / D ² PAK / I ² PAK	Total	0.9	$^{\circ}\text{C/W}$
		TO-220FPAB	Total	3.2	
$R_{th(c)}$		TO-220AB / D ² PAK / I ² PAK	Coupling	0.15	$^{\circ}\text{C/W}$
		TO-220FPAB	Coupling	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 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$			4.5	μA
		$T_j = 125\text{ °C}$			2	6	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 8\text{ A}$			0.71	V
		$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$			0.77	
		$T_j = 25\text{ °C}$	$I_F = 16\text{ A}$			0.81	
		$T_j = 25\text{ °C}$	$I_F = 20\text{ A}$			0.88	
		$T_j = 125\text{ °C}$	$I_F = 8\text{ A}$		0.56	0.58	
		$T_j = 125\text{ °C}$	$I_F = 10\text{ A}$		0.59	0.64	
		$T_j = 125\text{ °C}$	$I_F = 16\text{ A}$		0.65	0.68	
		$T_j = 125\text{ °C}$	$I_F = 20\text{ A}$		0.67	0.73	

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

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.55 \times I_{F(AV)} + 0.009 I_F^2 (RMS)$$

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

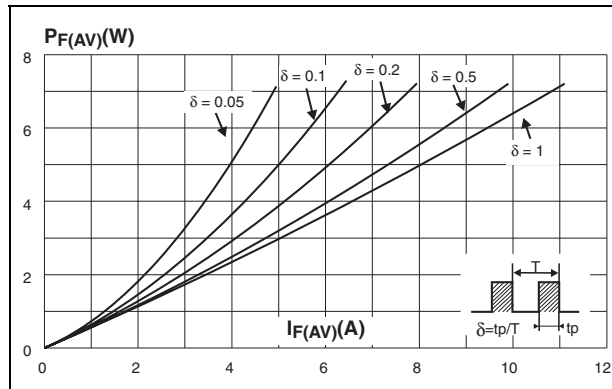


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

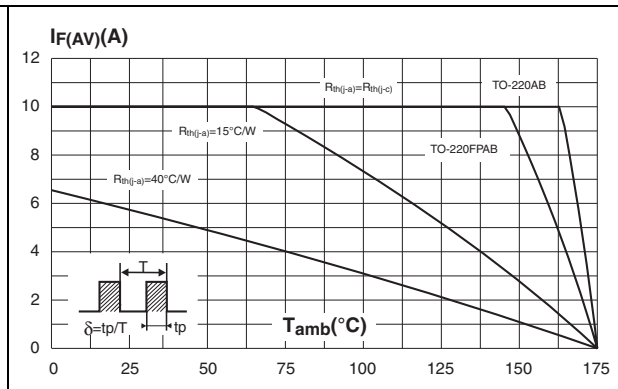


Figure 3. Normalized avalanche power derating versus pulse duration

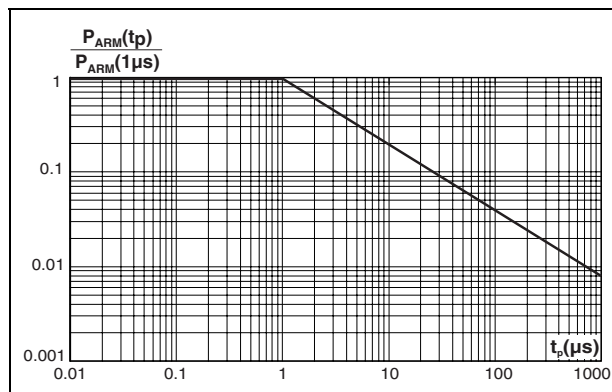


Figure 4. Normalized avalanche power derating versus junction temperature

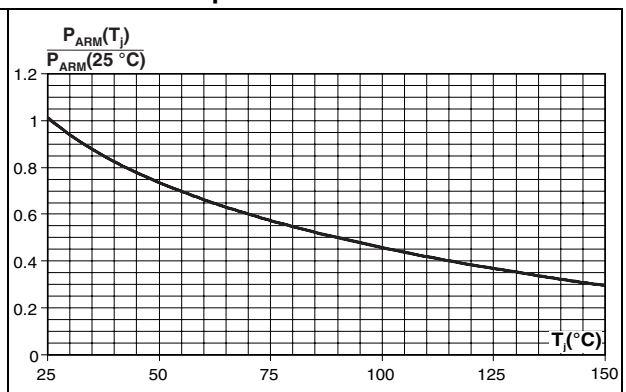


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

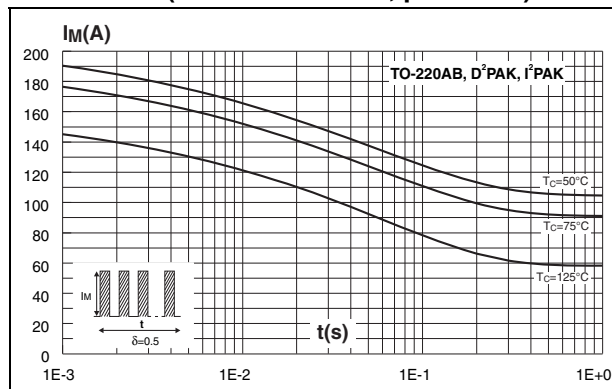


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

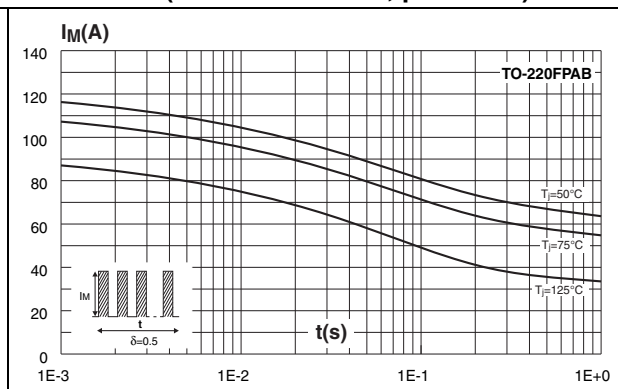


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

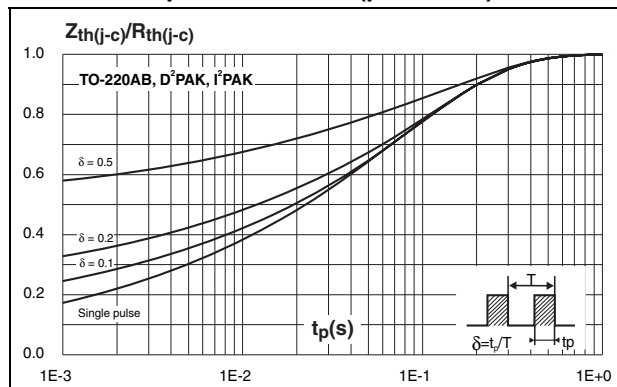


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

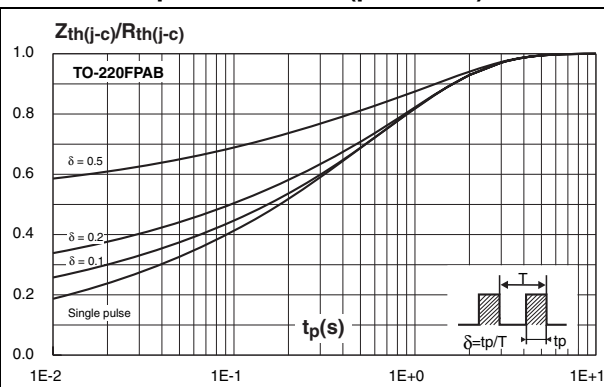


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

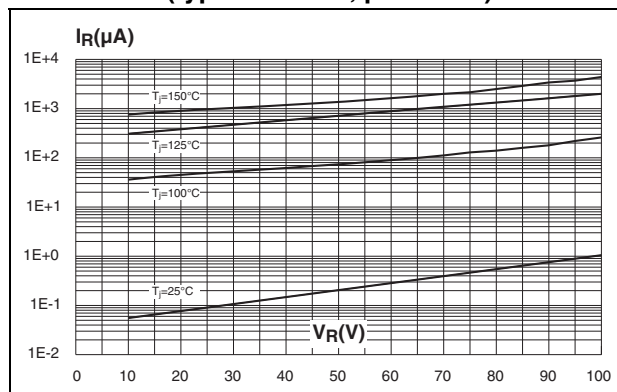


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

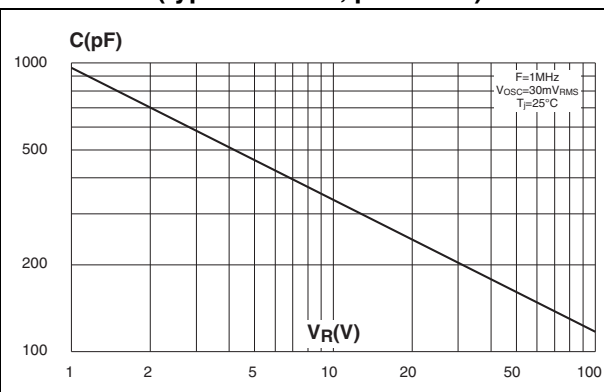


Figure 11. Forward voltage drop versus forward current (maximum values, per diode)

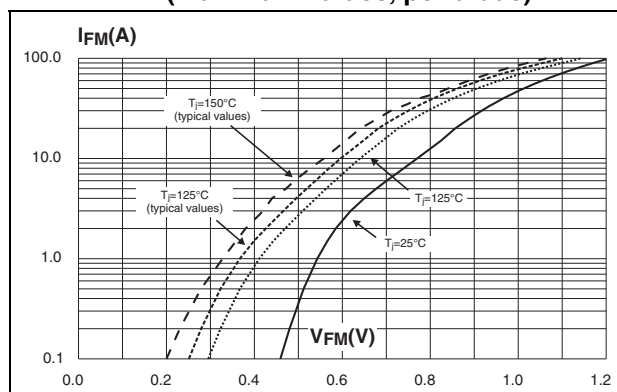
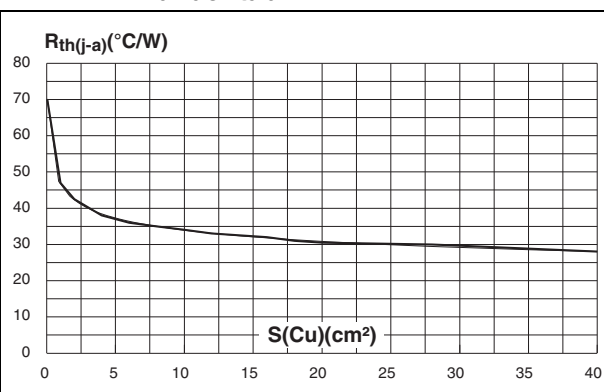


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



2 Package information

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

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Table 5. 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

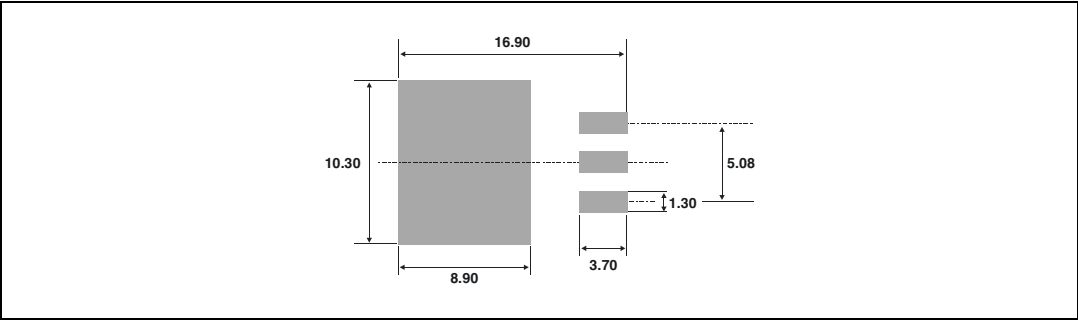
Table 6. TO-220FPAB dimensions

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	0.30	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	3.20	0.118	0.126

Table 7. 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 millimeters)



Mounting (soldering) the I²PAK metal slug (heatsink) with alloy, like a surface mount device, IS NOT PERMITTED. A standard through-hole mounting is mandatory.

Table 8. 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

3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS20H100CT	STPS20H100CT	TO-220AB	2.20 g	50	Tube
STPS20H100CT-H	STPS20H100CT	TO-220AB	2.20 g	50	Tube
STPS20H100CFP	STPS20H100CFP	TO-220FPAB	2.0 g	50	Tube
STPS20H100CR	STPS20H100CR	I ² PAK	1.49 g	50	Tube
STPS20H100CR-H	STPS20H100CR	I ² PAK	1.49 g	50	Tube
STPS20H100CG	STPS20H100CG	D ² PAK	1.48 g	50	Tube
STPS20H100CG-TR	STPS20H100CG	D ² PAK	1.48 g	1000	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
Jul-2003	4G	Previous release.
21-Mar-2007	5	Removed ISOWATT package.
10-Sep-2007	6	Reformatted cover page to current standards - no technical changes. Updated dimensions A1, b, b1, c, c2, L, and L1 in Table 8 .
22-Sep-2011	7	Updated Table 8 .

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