

## Power Schottky rectifier

### Features

- High current capability
- Avalanche rated
- Low forward voltage drop current
- High frequency operation

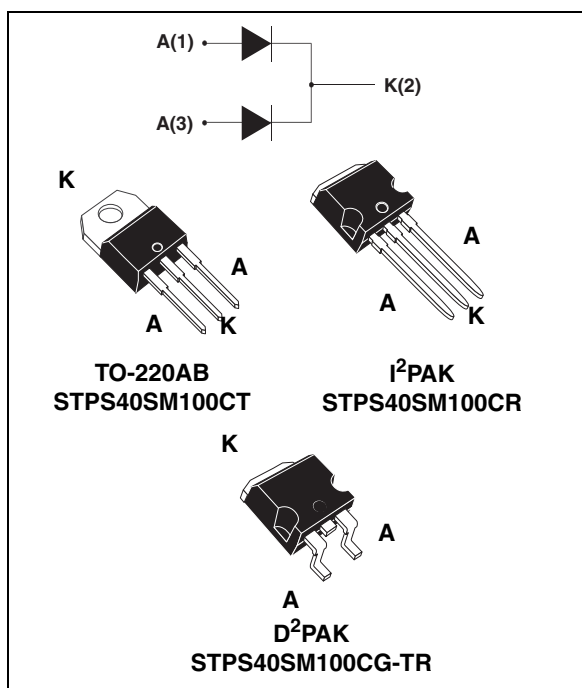
### Description

Schottky rectifier, suited for high frequency switch mode power supply.

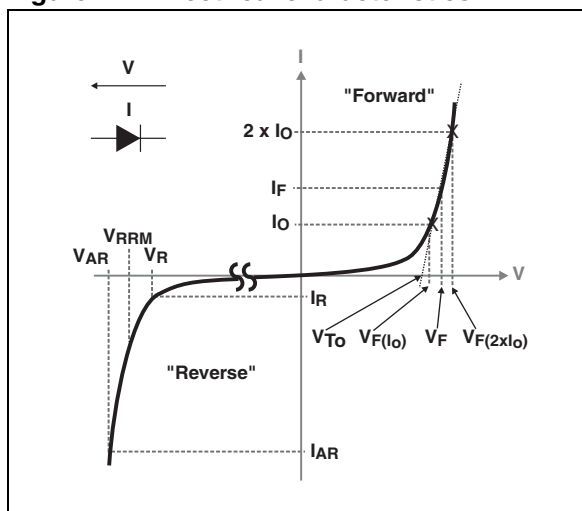
Packaged in TO-220AB, D<sup>2</sup>PAK and I<sup>2</sup>PAK, this device is intended to be used in notebook, game station and desktop adaptors, providing in these applications a good efficiency at both low and high load.

**Table 1. Device summary**

$I_{F(AV)}$	2 x 20 A
$V_{RRM}$	100 V
$T_j (max)$	150 °C
$V_F(typ)$	0.435 V



**Figure 1. Electrical characteristics (a)**



- a.  $V_{ARM}$  and  $I_{ARM}$  must respect the reverse safe operating area defined in [Figure 11](#).  $V_{AR}$  and  $I_{AR}$  are pulse measurements ( $t_p < 1 \mu s$ ).  $V_R$ ,  $I_R$ ,  $V_{RRM}$  and  $V_F$  are static characteristics

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

Symbol	Parameter	Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage	100	V	
I <sub>F(RMS)</sub>	Forward current rms	60	A	
I <sub>F(AV)</sub>	Average forward current $\delta = 0.5$	T <sub>c</sub> = 130 °C Per diode	20	A
		T <sub>c</sub> = 125 °C Per device	40	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	530	A
P <sub>ARM</sub> <sup>(1)</sup>	Repetitive peak avalanche power	t <sub>p</sub> = 1 $\mu$ s T <sub>j</sub> = 25 °C	18000	W
V <sub>ARM</sub> <sup>(2)</sup>	Maximum repetitive peak avalanche voltage	t <sub>p</sub> < 1 $\mu$ s T <sub>j</sub> < 150 °C I <sub>AR</sub> < 45 A	120	V
V <sub>ASM</sub> <sup>(2)</sup>	Maximum single pulse peak avalanche voltage	t <sub>p</sub> < 1 $\mu$ s T <sub>j</sub> < 150 °C I <sub>AR</sub> < 45 A	120	V
T <sub>stg</sub>	Storage temperature range	-65 to + 175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(3)</sup>	150	°C	

- For temperature or pulse time duration deratings, refer to [Figure 4](#), and [Figure 5](#). More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
- Refer to [Figure 11](#).
- $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	1.3
		Total	0.7
R <sub>th(c)</sub>	Coupling	0.1	°C/W

**Table 4. Static electrical characteristics (per diode, at 25 °C unless otherwise specified)**

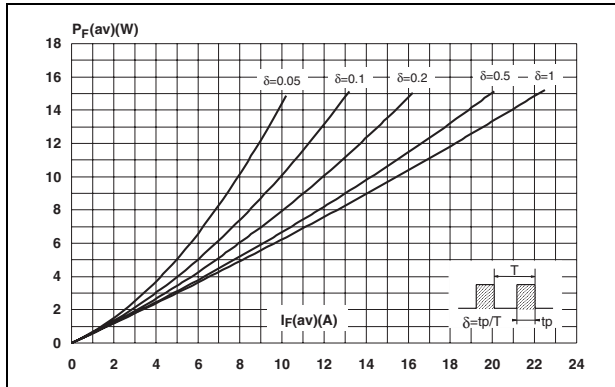
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = 70 V	7		$\mu$ A
		T <sub>j</sub> = 125 °C		7		mA
		T <sub>j</sub> = 25 °C	V <sub>R</sub> = 100 V	13	45	$\mu$ A
		T <sub>j</sub> = 125 °C		13	45	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 5 A	520		mV
		T <sub>j</sub> = 125 °C		435		
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 10A	620	700	
		T <sub>j</sub> = 125 °C		520	580	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 20 A	740	810	
		T <sub>j</sub> = 125 °C		605	665	

- Pulse test: t<sub>p</sub> = 5 ms,  $\delta < 2\%$
- Pulse test: t<sub>p</sub> = 380  $\mu$ s,  $\delta < 2\%$

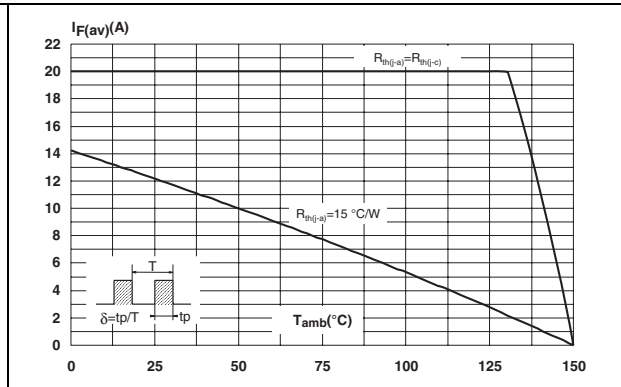
To evaluate the conduction losses use the following equation:

$$P = 0.580 \times I_{F(AV)} + 0.0043 \times I_{F(RMS)}^2$$

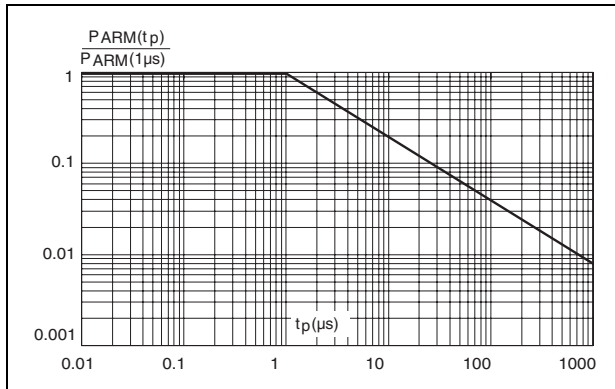
**Figure 2. Average forward power dissipation versus average forward current (per diode)**



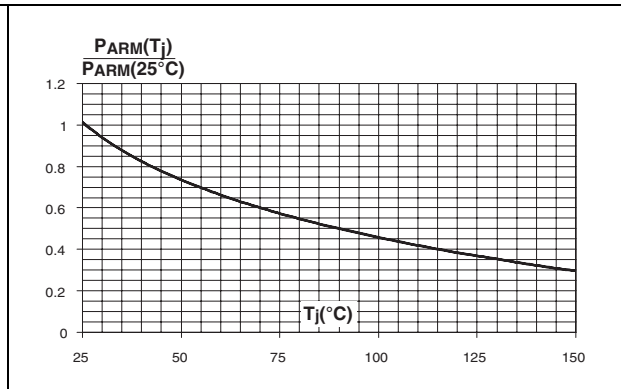
**Figure 3. Average forward current versus ambient temperature (delta = 0.5, per diode)**



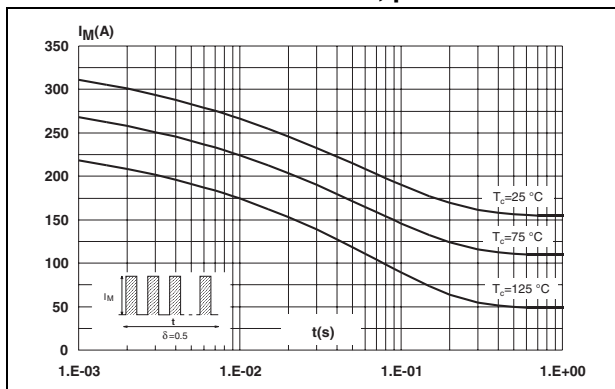
**Figure 4. Normalized avalanche power derating versus pulse duration**



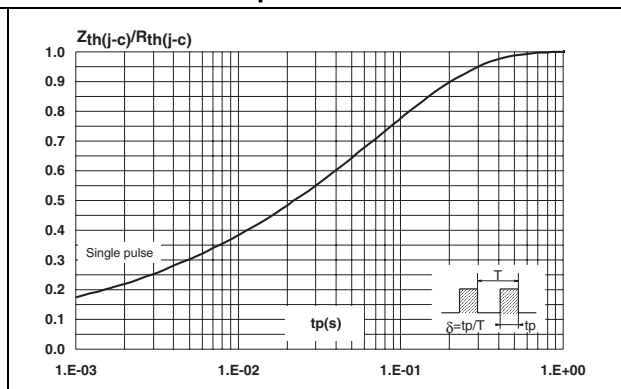
**Figure 5. Normalized avalanche power derating versus junction temperature**



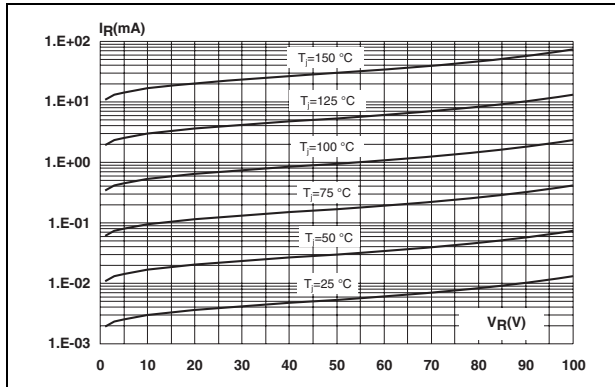
**Figure 6. Non repetitive surge peak forward current versus overload duration, maximum values, per diode**



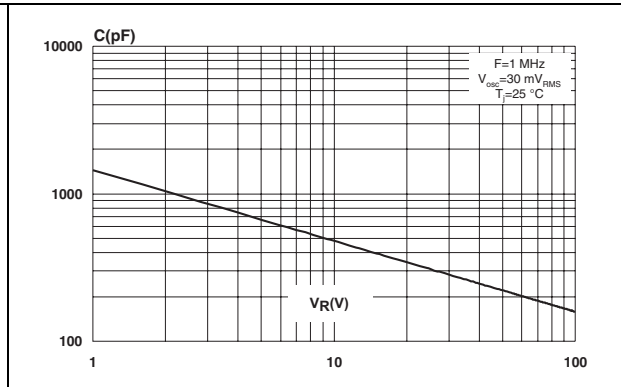
**Figure 7. Relative variation of thermal impedance junction to case versus pulse duration**



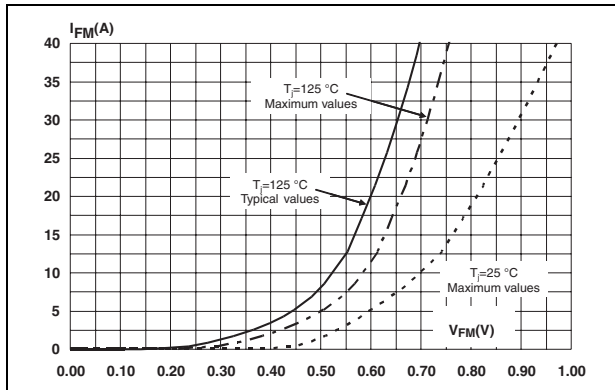
**Figure 8. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



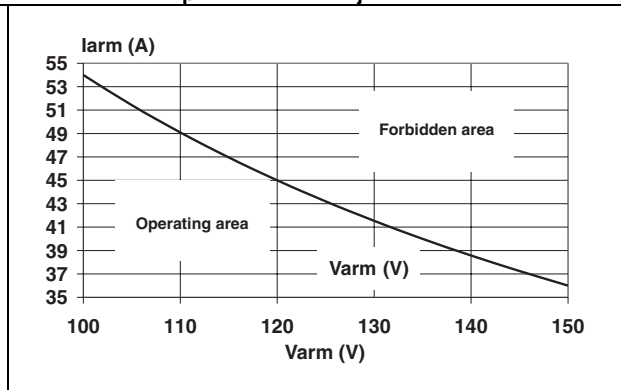
**Figure 9. Junction capacitance versus reverse voltage applied (typical values, per diode)**



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



**Figure 11. Reverse safe operating area ( $t_p < 1 \mu s$  and  $T_j < 150$  °C)**



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: 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.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l3	1.14		1.70	0.044		0.066
M		2.60			0.102	

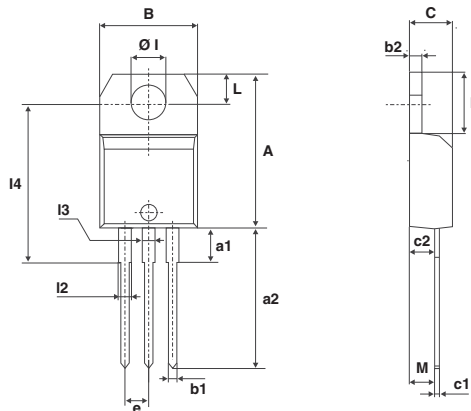


Table 6. I<sup>2</sup>PAK dimensions

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

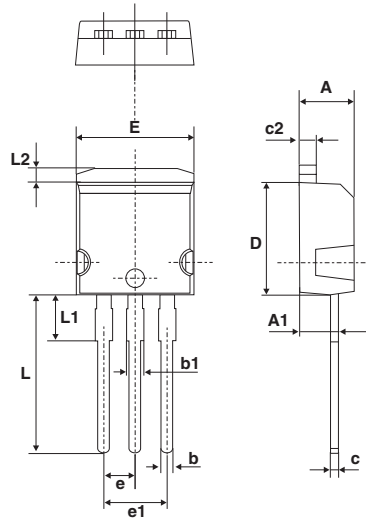
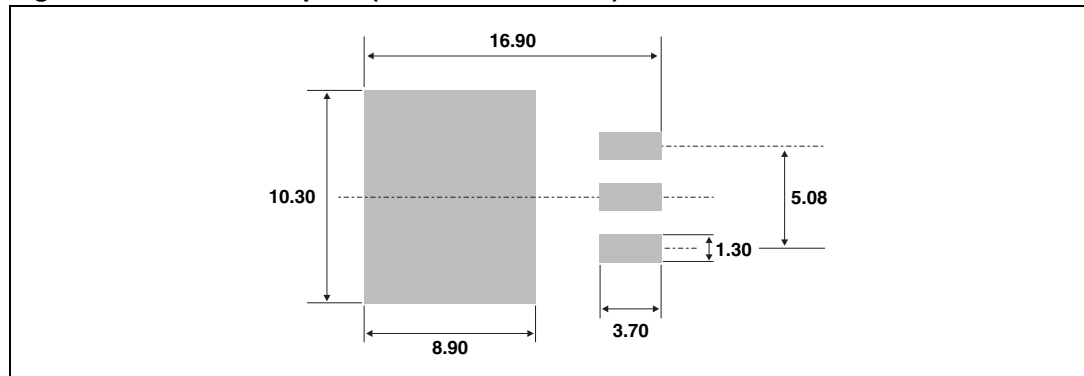


Table 7. D<sup>2</sup>PAK dimensions

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 12. D<sup>2</sup>PAK footprint (dimensions in mm)



### 3 Ordering information

**Table 8. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS40SM100CT	PS40SM100CT	TO-220AB	2.2 g	50	Tube
STPS40SM100CR	PS40SM100CR	I <sup>2</sup> PAK	1.49 g	50	Tube
STPS40SM100CG	PS40SM100CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STPS40SM100CG-TR	PS40SM100CG	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel

### 4 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
25-Mar-2009	1	First issue



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