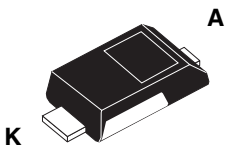
STPS120MF

Power Schottky rectifier in flat package

Features

- Very low profile package: 0.85 mm
- Backward compatible with standard STmite footprint
- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward voltage drop for higher efficiency and extended battery life
- Low thermal resistance
- Avalanche capability specified
- Hologen free molding compound



STmite flat
(DO222-AA)

Table 1. Device summary

$I_{F(AV)}$	1 A
V_{RRM}	20 V
T_j (max)	150 °C
V_F (max)	0.41 V

Description

Single Schottky rectifier suited for switch mode power supplies and high frequency dc to dc converters.

Packaged in STmite flat, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications. Due to the very small size of the package this device fits battery powered equipment (cellular, notebook, PDA's, printers) as well as chargers and PCMCIA cards.

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		20	V
$I_{F(RMS)}$	Forward current rms		2	A
$I_{F(AV)}$	Average forward current	T_c = 140 °C δ = 0.5	1	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	50	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C	1400	W
T_{stg}	Storage temperature range		-65 to + 150	°C
T_j	Maximum operating junction temperature(1)		150	°C
dV/dt	Critical rate of rise of reverse voltage (rated V_R, T_j = 25 °C)		10000	V/µs

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	20	°C/W
$R_{th(j-a)}$(1)	Junction to ambient	250	°C/W

1. Mounted with minimum recommended pad size, PC board FR4

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$		1.3	3.9	µA
		T_j = 100° C			275	850	
		T_j = 25° C	V_R = 10 V		0.6	2.0	
		T_j = 100° C			145	450	
		T_j = 25° C	V_R = 5 V		0.4	10.	
		T_j = 100° C			105	300	
V_F(1)	Forward voltage drop	T_j = 25° C	I_F = 1 A		0.44	0.49	V
		T_j = 100° C			0.36	0.41	
		T_j = 25° C	I_F = 2 A		0.48	0.54	
		T_j = 100° C			0.42	0.48	

1. Pulse test: tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.34 \times I_{F(AV)} + 0.07\ I_F{}^2{}_{(RMS)}$

Figure 1. Conduction losses versus average current

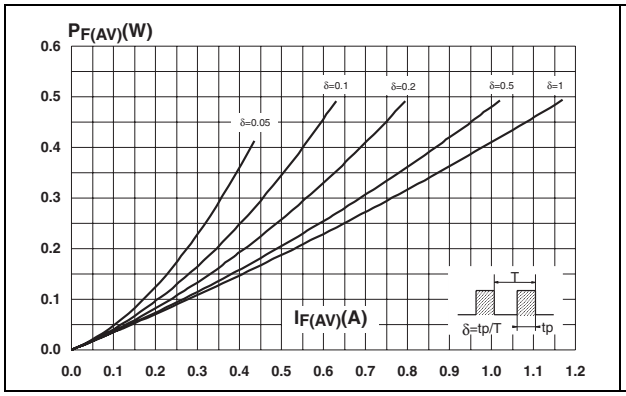


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

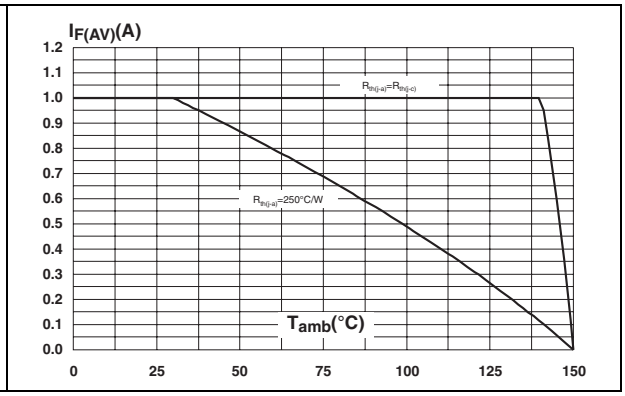


Figure 3. Normalized avalanche power derating versus pulse duration

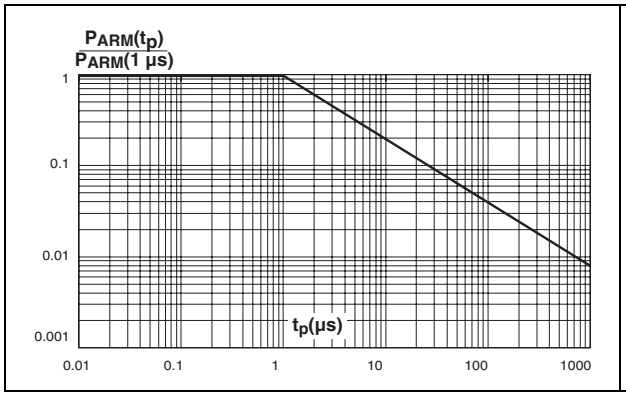


Figure 4. Normalized avalanche power derating versus junction temperature

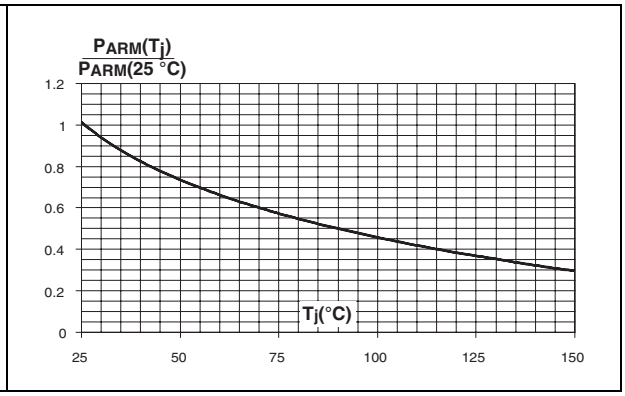


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values)

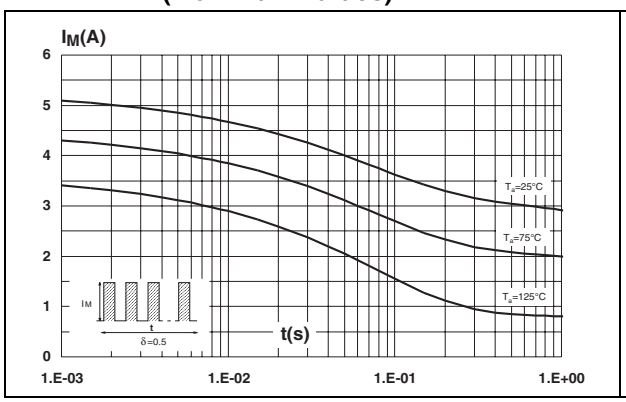


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration

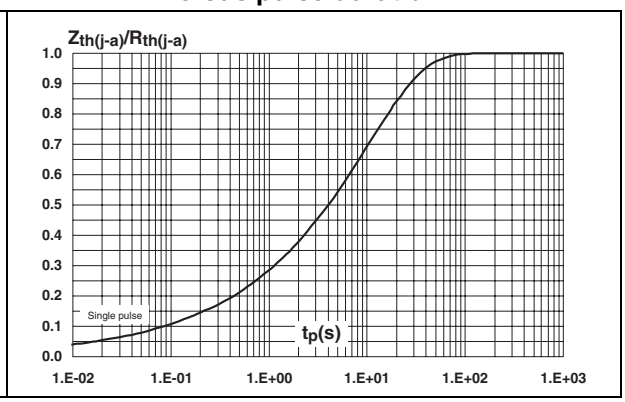


Figure 7. Reverse leakage current versus reverse voltage applied (typical values)

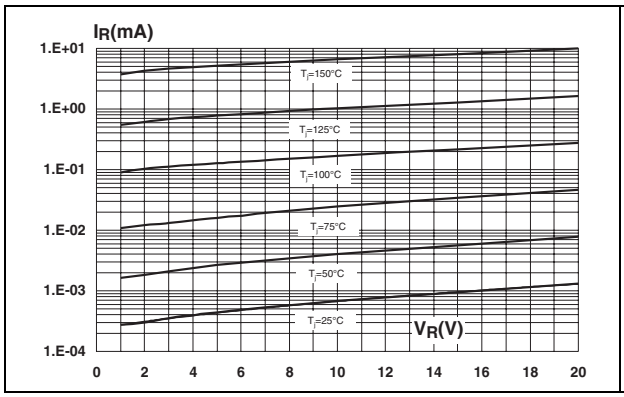


Figure 8. Junction capacitance versus reverse voltage applied (typical values)

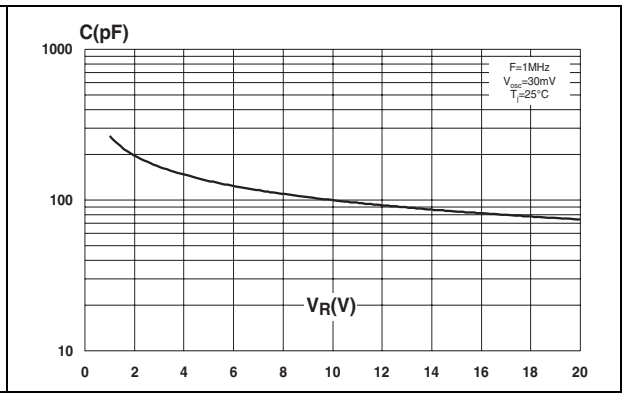


Figure 9. Forward voltage drop versus forward current (low level)

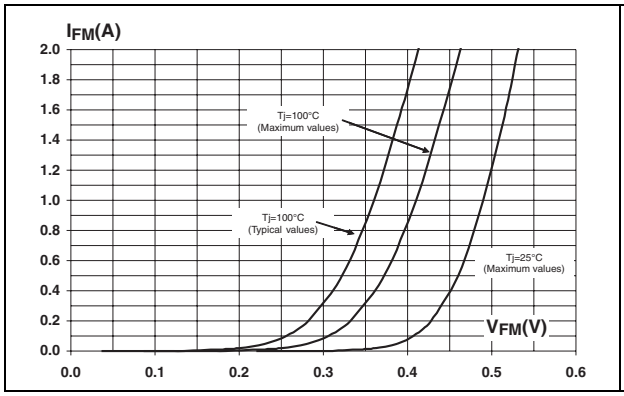


Figure 10. Forward voltage drop versus forward current (high level)

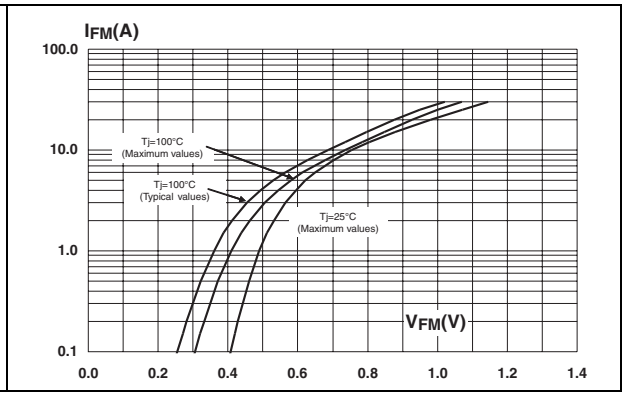
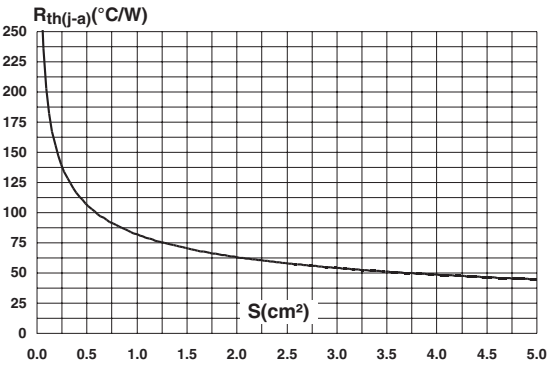


Figure 11. Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, Cu = 35 µm, typical values)

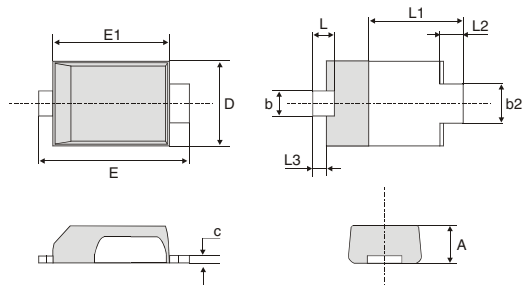


2 Package information

- Epoxy meets UL94, V0

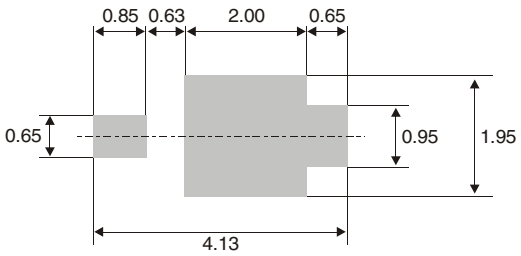
In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at *www.st.com*.

Table 5. STmite flat dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80	0.85	0.95	0.031	0.033	0.037
b	0.40	0.55	0.65	0.016	0.022	0.026
b2	0.70	0.85	1.00	0.027	0.033	0.039
c	0.10	0.15	0.25	0.004	0.006	0.009
D	1.75	1.90	2.05	0.069	0.075	0.081
E	3.60	3.80	3.90	0.142	0.150	0.154
E1	2.80	2.95	3.10	0.110	0.116	0.122
L	0.50	0.55	0.80	0.020	0.022	0.031
L1	2.10	2.40	2.60	0.083	0.094	0.102
L2	0.45	0.60	0.75	0.018	0.024	0.030
L3	0.20	0.35	0.50	0.008	0.014	0.020

Figure 12. STmite flat recommended footprint (all dimensions in mm)



3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS120MF	F12	STmite flat	16 mg	12000	Tape and reel

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
15-May-2008	1	First issue.

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