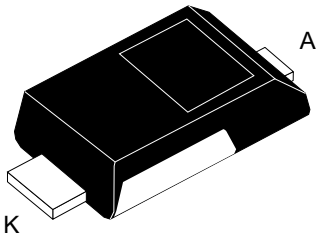
STPS120MF

Power Schottky rectifier in flat package

Datasheet - production data



STmite flat
(DO222-AA)

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
- Halogen free molding compound

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.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	20 V
T_j (max)	150 °C
V_F (typ)	0.36 V

1 Characteristics

Table 2. Absolute ratings (limiting values at T_{amb} = 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		20	V
$I_{F(RMS)}$	Forward rms current		2	A
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	T_c = 140 °C	1	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	50	A
P_{ARM}(1)	Repetitive peak avalanche power	T_j = 125 °C, t_p = 10 µs	100	W
T_{stg}	Storage temperature range		-65 to +150	°C
T_j	Maximum operating junction temperature(2)		150	°C

1. For pulse time duration deratings, please refer to *Figure 3*. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the STMicroelectronics Application notes AN1768, “Admissible avalanche power of Schottky diodes” and AN2025, “Converter improvement using Schottky rectifier avalanche specification”.
2. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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	1.0	
		T_j = 100 °C			105	300	
V_F(2)	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: t_p = 380 µs, δ < 2%
2. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.34 \times I_{F(AV)} + 0.07 \times I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current

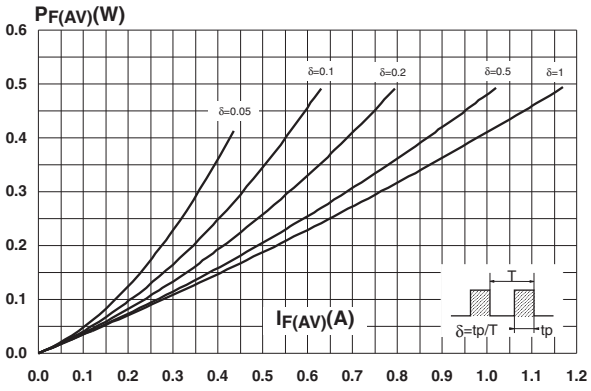


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

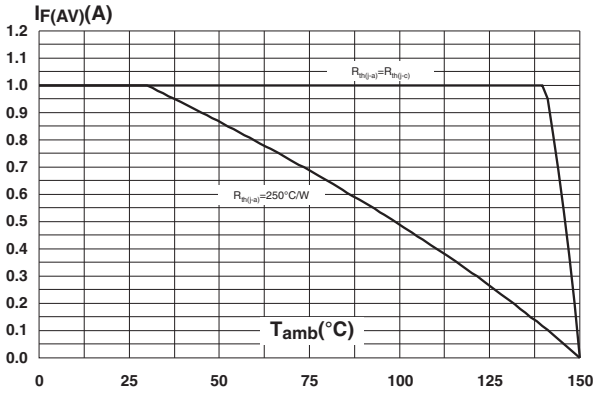


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

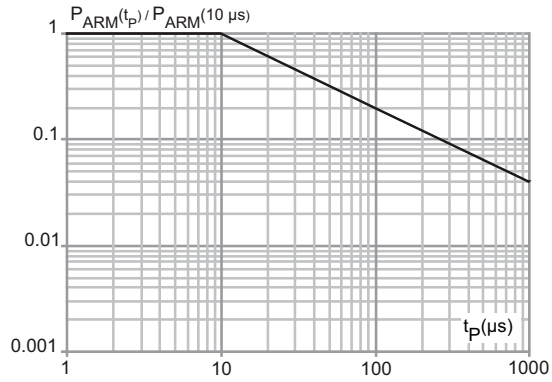


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration

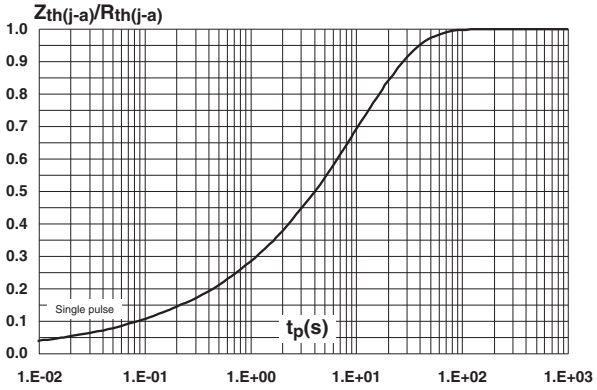


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

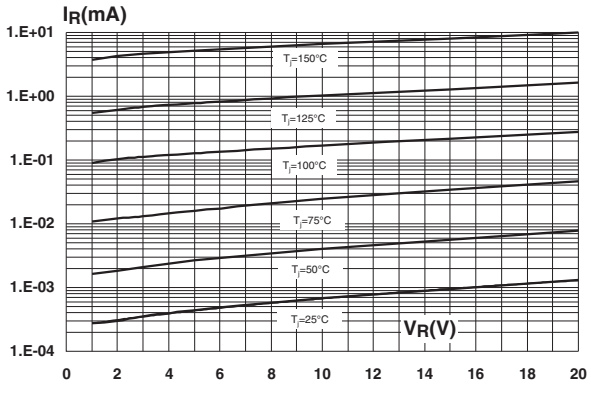


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

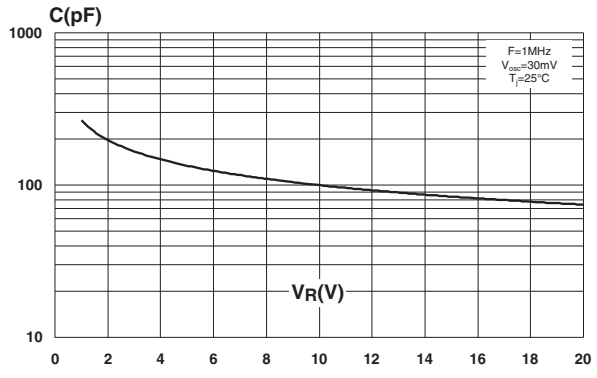


Figure 7. Forward voltage drop versus forward current (low level)

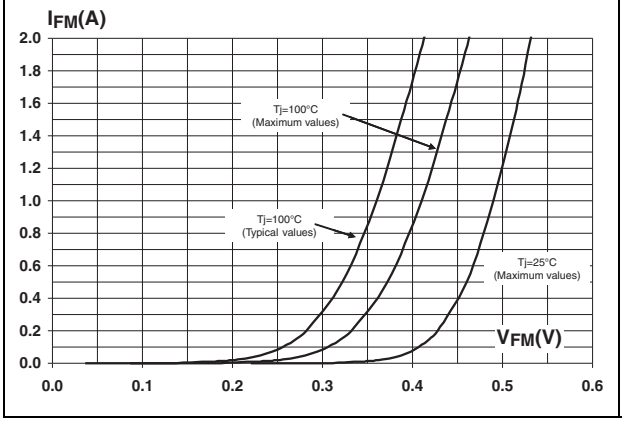


Figure 8. Forward voltage drop versus forward current (high level)

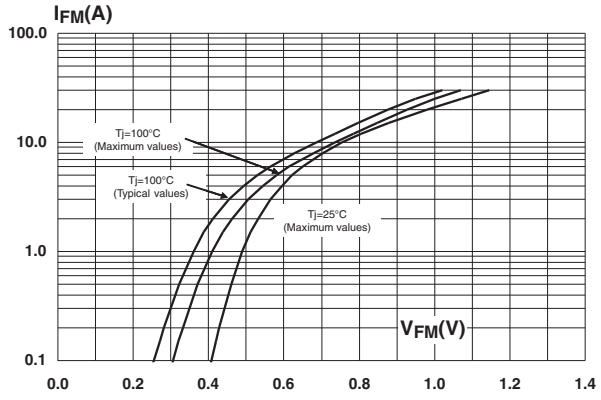
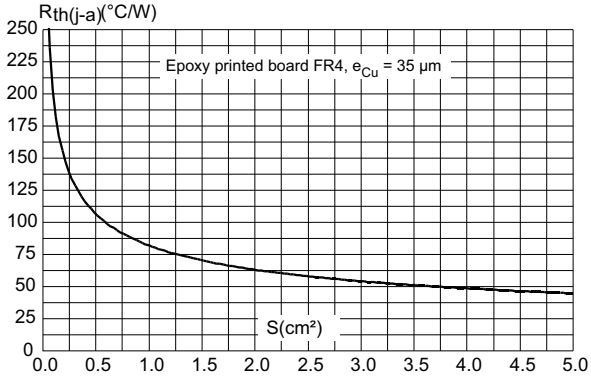


Figure 9. Thermal resistance junction to ambient versus copper surface under tab (typical values)



2 Package information

- Epoxy meets UL94, V0

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*.
ECOPACK® is an ST trademark.

2.1 STmite flat package information

Figure 10. STmite flat package outline

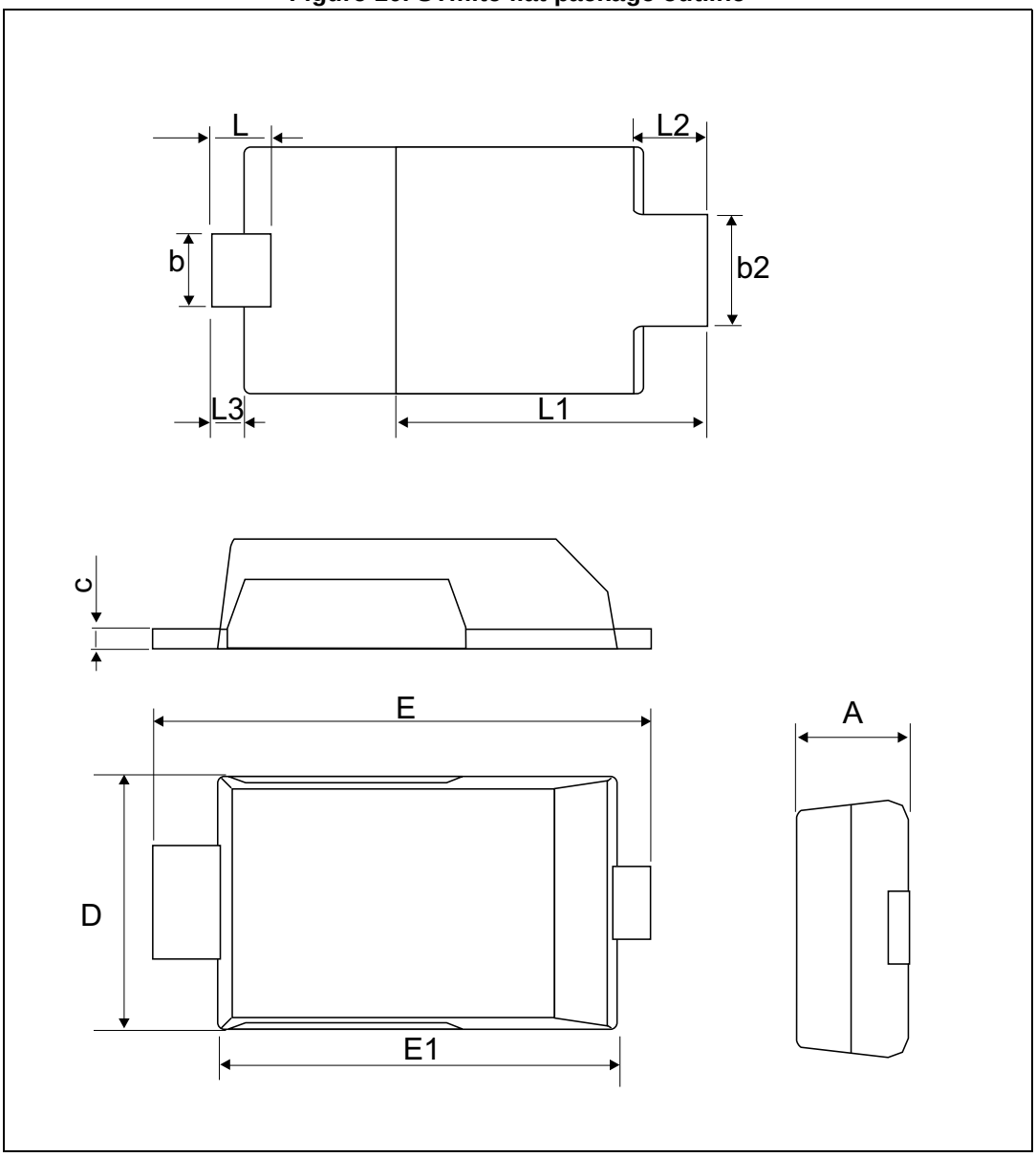
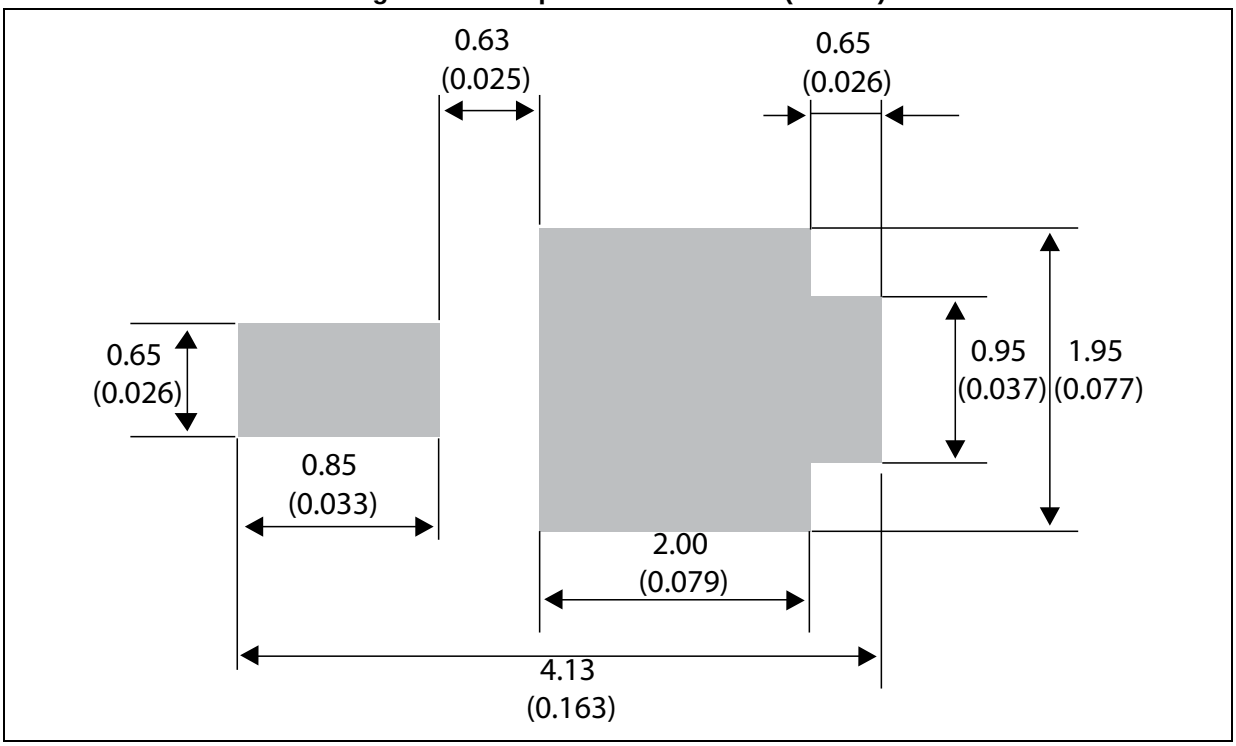


Table 5. STmite flat package mechanical data

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 11. Footprint in millimeters (inches)



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.
23-Apr-2014	2	Updated ECOPAK statement.
21-Jul-2015	3	Updated *Table 4* and reformatted to current standard.