STPS1L40

Low drop power Schottky rectifier

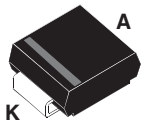
Features

- Very small conduction losses
- Negligible switching losses
- Low forward voltage drop
- Surface mount miniature packages
- Avalanche capability specified

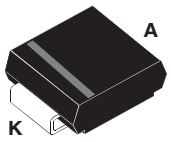
Description

Single chip Schottky rectifiers suited to switched mode power supplies and high frequency DC to DC converters.

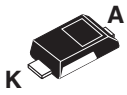
Packaged in SMA, SMB and STmite flat this device is especially intended for surface mounting and used in low voltage, high frequency inverters, free wheeling and polarity protection applications.



SMA
(JEDEC DO-214AC)
STPS1L40A



SMB
(JEDEC DO-214AA)
STPS1L40U



STmite flat
STPS1L40MF

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	40 V
T_j (max)	150 °C
V_F(max)	0.42 V

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			40	V
$I_{F(RMS)}$	Forward rms current	SMA / SMB		8	A
		STmite flat		2	
$I_{F(AV)}$	Average forward current	SMA / SMB	T_L = 130 °C δ = 0.5	1	A
		STmite flat	T_C = 135 °C δ = 0.5		
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal	60	A
I_{RRM}	Repetitive peak reverse current		t_p = 2 µs F = 1 kHz square	1	A
I_{RSM}	Non repetitive peak reverse current		t_p = 100 µs square	1	A
P_{ARM}	Repetitive peak avalanche power		t_p = 1 µs T_j = 25 °C	900	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			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
$R_{th(j-l)}$	Junction to lead	SMA	30	°C/W
		SMB	25	
$R_{th(j-c)}$	Junction to case	STmite flat	20	

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	-	35	µA
		T_j = 125 °C		-	6	10	mA
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 1 A	-	-	0.5	V
		T_j = 125 °C		-	0.37	0.42	
		T_j = 25 °C	I_F = 2 A	-	-	0.63	
		T_j = 125 °C		-	0.5	0.61	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.23 \times I_{F(AV)} + 0.19\ I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current

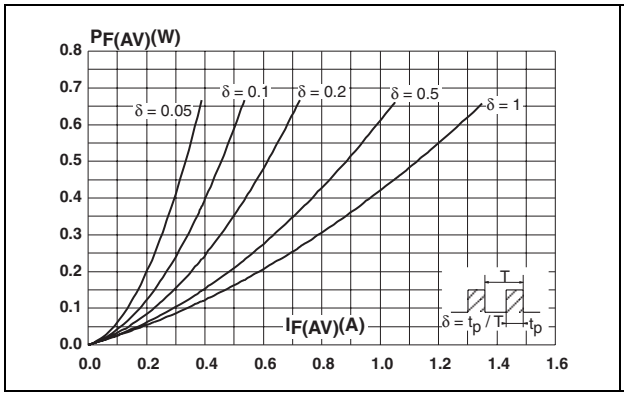


Figure 2. Average forward current versus ambient temperature (SMA, δ = 0.5)

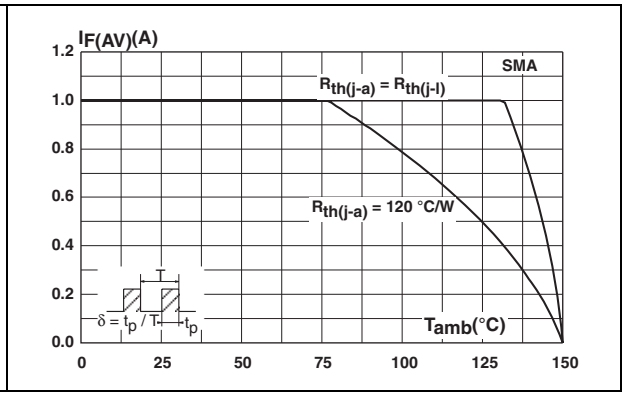


Figure 3. Average forward current versus ambient temperature (SMB, δ = 0.5)

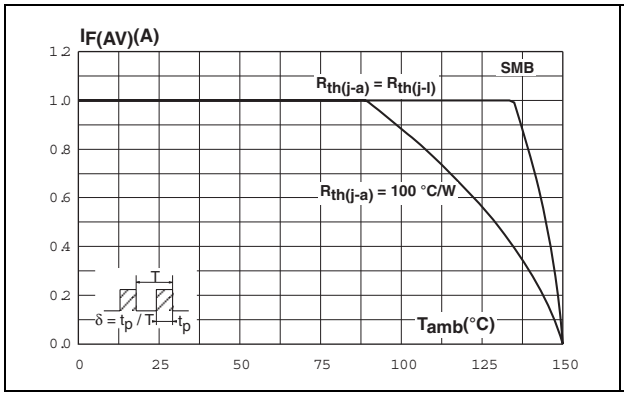


Figure 4. Average forward current versus ambient temperature (STmite flat, δ = 0.5)

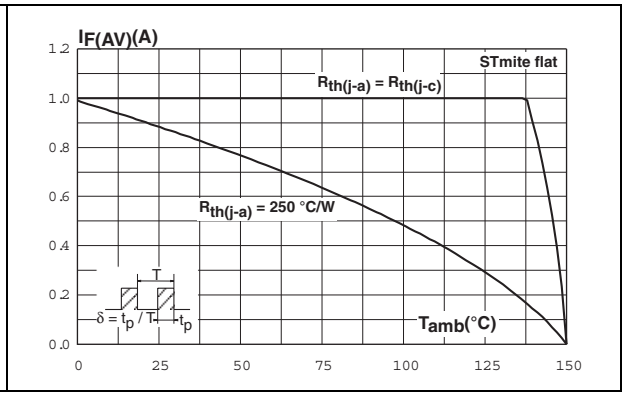


Figure 5. Normalized avalanche power derating versus pulse duration

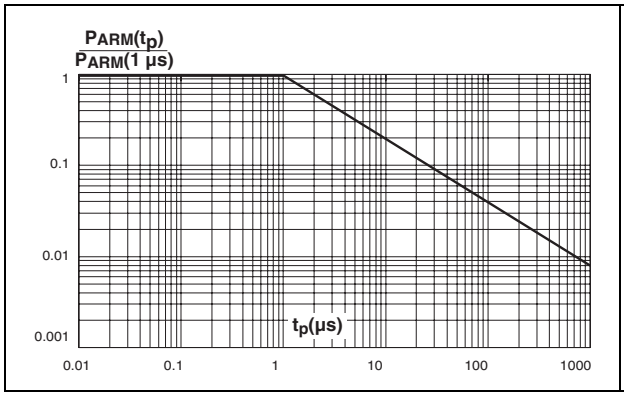


Figure 6. Normalized avalanche power derating versus junction temperature

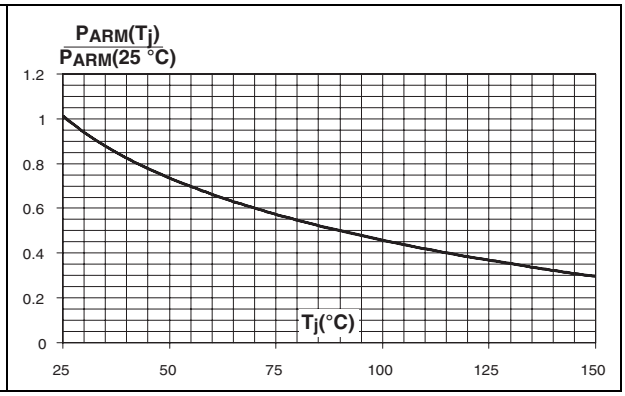


Figure 7. Non repetitive surge peak forward current versus overload duration (maximum values, SMA)

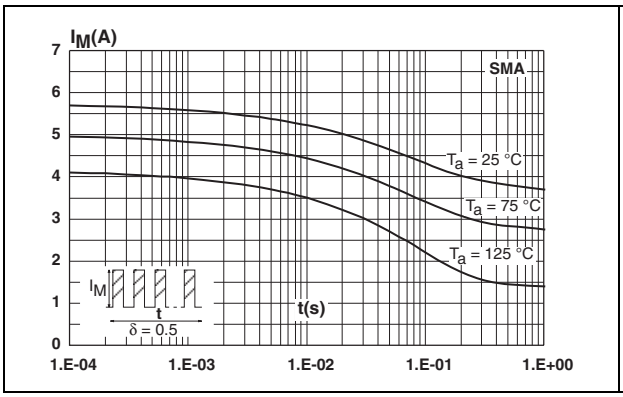


Figure 8. Non repetitive surge peak forward current versus overload duration (maximum values, SMB)

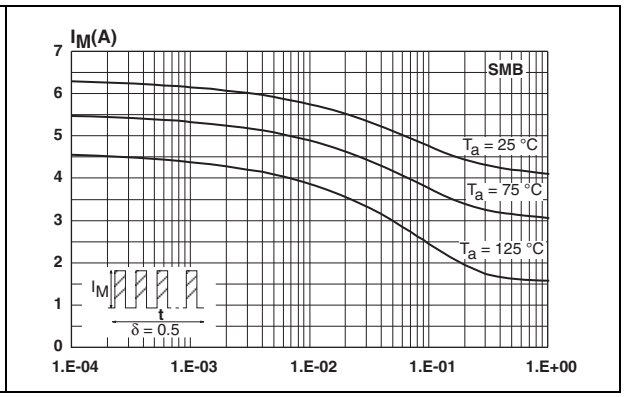


Figure 9. Non repetitive surge peak forward current versus overload duration (maximum values, STmite flat)

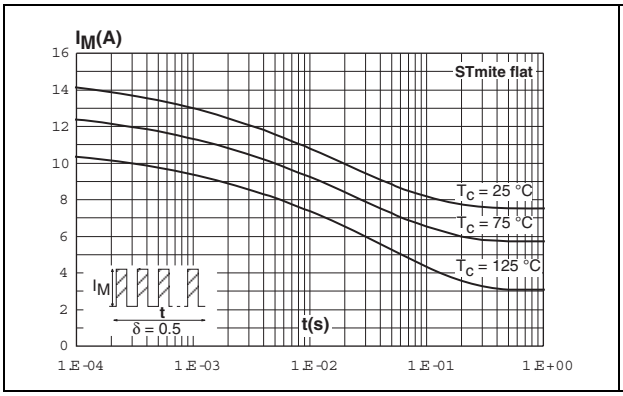


Figure 10. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)

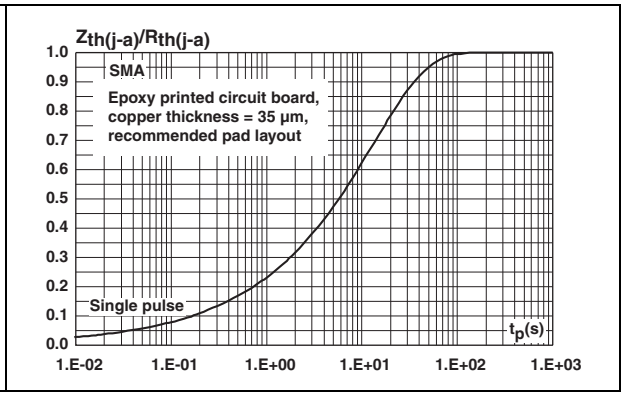


Figure 11. Relative variation of thermal impedance junction to ambient versus pulse duration (SMB)

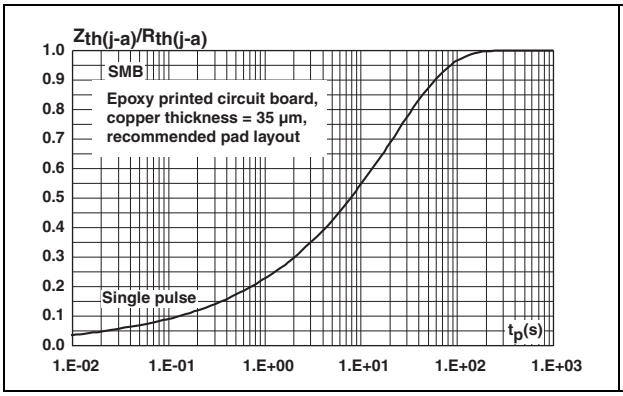


Figure 12. Relative variation of thermal impedance junction to ambient versus pulse duration (STmite flat)

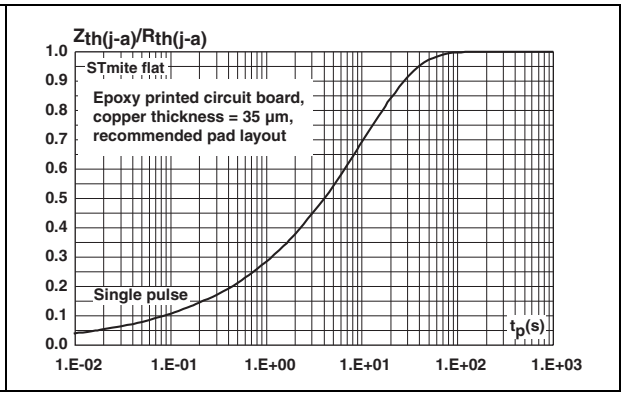


Figure 13. Reverse leakage current versus reverse voltage applied (typical values)

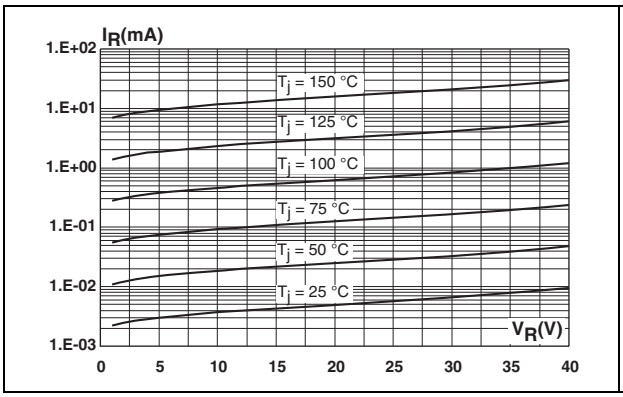


Figure 14. Junction capacitance versus reverse voltage applied (typical values)

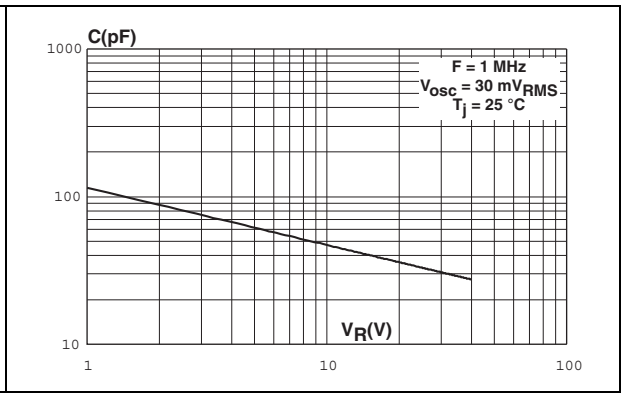


Figure 15. Forward voltage drop versus forward current (typical values, high level)

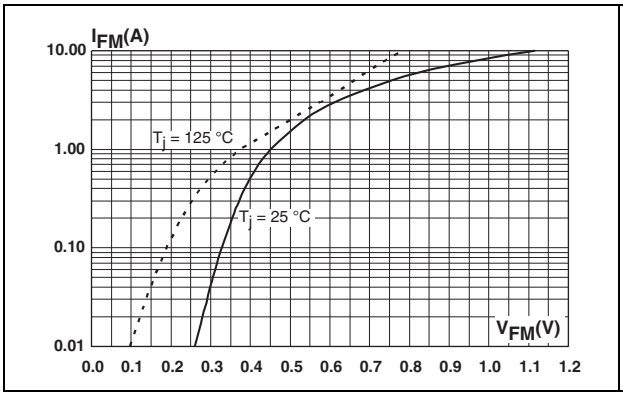


Figure 16. Forward voltage drop versus forward current (typical values, low level)

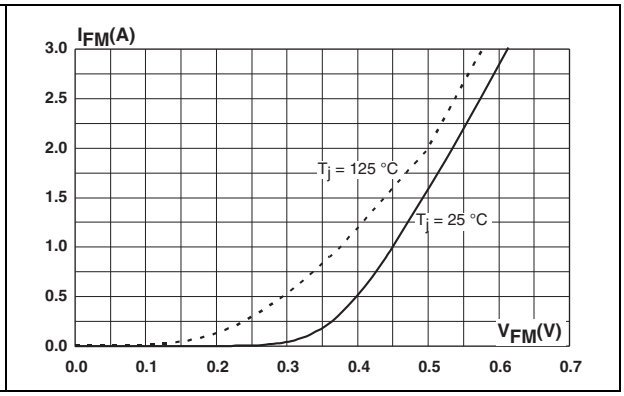


Figure 17. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

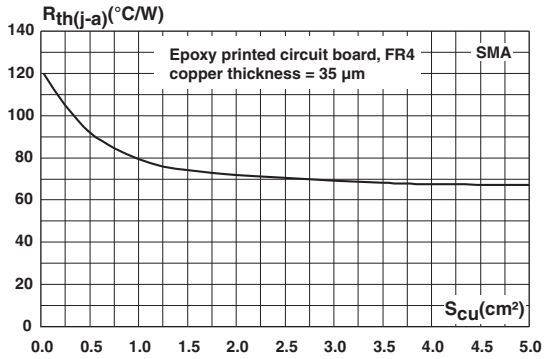


Figure 18. Thermal resistance junction to ambient versus copper surface under each lead (SMB)

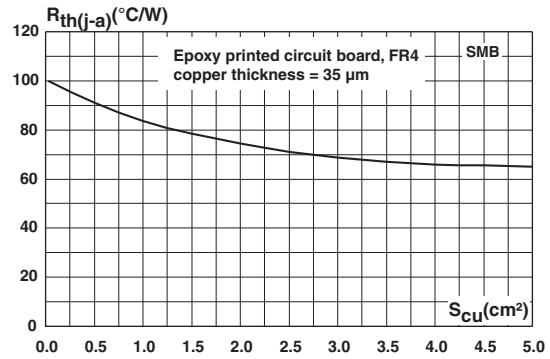
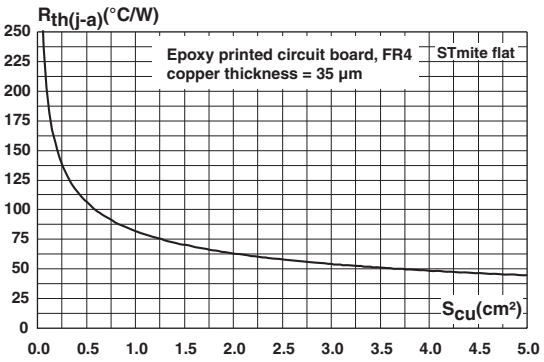


Figure 19. Thermal resistance junction to ambient versus copper surface under tab (STmite flat)

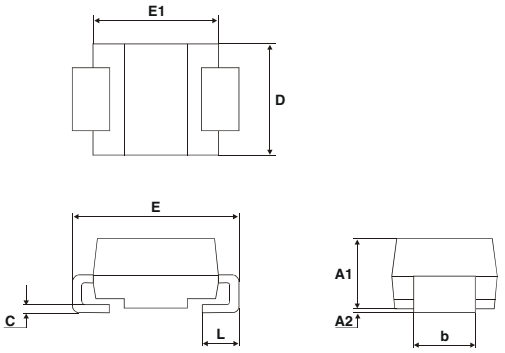


2 Package information

- Epoxy meets UL94, V0
- Cathode band (SMA, SMB)

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.

Table 5. SMA dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

Figure 20. Footprint, dimensions in mm (inches)

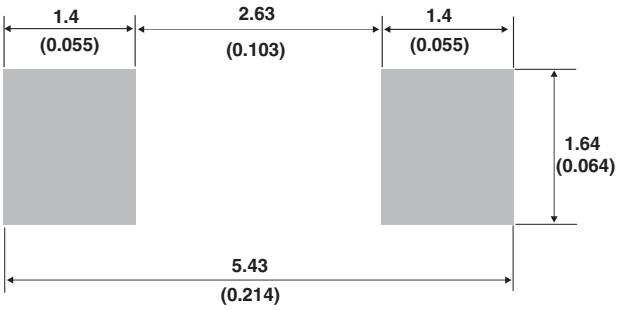
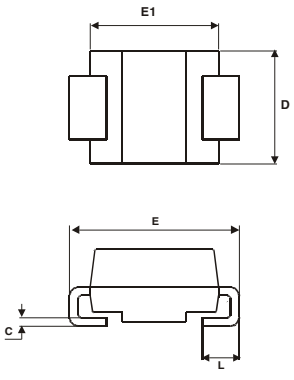


Table 6. SMB dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 21. Footprint, dimensions in mm (inches)

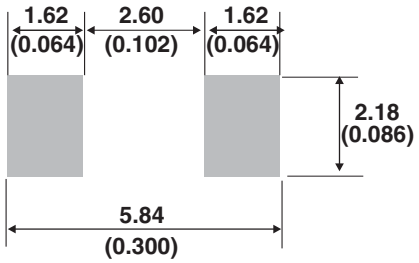
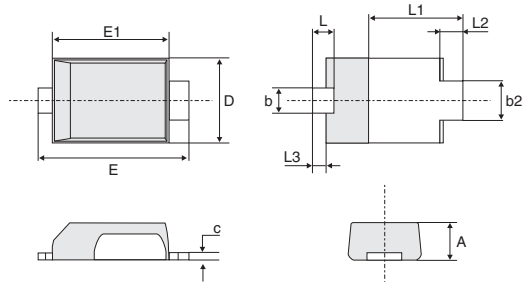
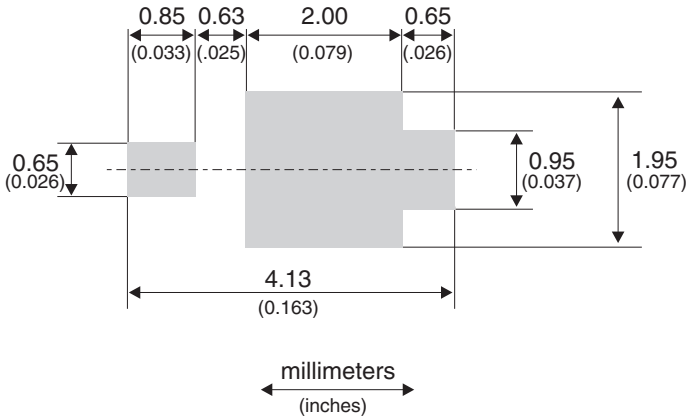


Table 7. STmite flat dimensions



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 22. Footprint dimensions



3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS1L40A	GB4	SMA	0.068 g	5000	Tape and reel
STPS1L40U	GC4	SMB	0.107 g	2500	Tape and reel
STPS1L40MF	F1L4	STmite flat	0.016 g	1200	Tape and reel

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
Jul-2003	4A	Last update.
Aug-2004	5	SMA package dimensions update. Reference A1 max. changed from 2.70 mm (0.106 inch.) to 2.03 mm (0.080).
24-Jun-2009	6	Added STmite flat package.

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