

## Power Schottky rectifier

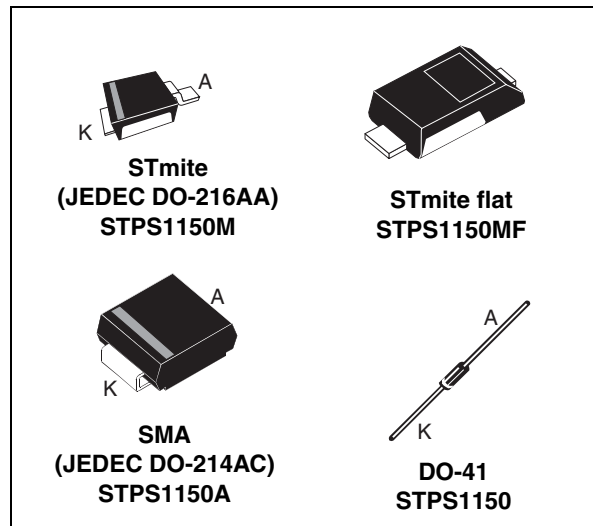
### Features

- Negligible switching losses
- Low forward voltage drop for higher efficiency and extended battery life
- Low thermal resistance
- Surface mount miniature package
- Avalanche capability specified

### Description

These 150 V power Schottky rectifiers are suited for switch mode power supplies on up to 24 V rails and high frequency converters.

Packaged in STmite/STmite flat, SMA and axial, this device is intended for use in consumer and computer applications like TV, STB, PC and DVD where low drop forward voltage is required to reduce power dissipation.



**Table 1. Device summary**

|             |        |
|-------------|--------|
| $I_{F(AV)}$ | 1 A    |
| $V_{RRM}$   | 150 V  |
| $T_j$ (max) | 175 °C |
| $V_F$ (max) | 0.67 V |

# 1 Characteristics

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

| Symbol       | Parameter   |             | Value                                     | Unit |   |
|--------------|---|-------------|---|------|---|
| $V_{RRM}$    | Repetitive peak reverse voltage                       |             | 150                                       | V    |   |
| $I_{F(RMS)}$ | Forward rms current                                   |             | 15  | A    |   |
| $I_{F(AV)}$  | Average forward current                               | STmite/flat | $T_c = 160\text{ °C}$ $\delta = 0.5$      | 1    | A |
|              |   | SMA         | $T_L = 160\text{ °C}$ $\delta = 0.5$      |      |   |
|              |   | DO-41       | $T_L = 150\text{ °C}$ $\delta = 0.5$      |      |   |
| $I_{FSM}$    | Surge non repetitive forward current                  | STmite/flat | $t_p = 10\text{ ms sinusoidal}$           | 50   | A |
|              |   | SMA         |   | 50   |   |
|              |   | DO-41       |   | 75   |   |
| $P_{ARM}$    | Repetitive peak avalanche power                       |             | $t_p = 1\mu\text{s}$ $T_j = 25\text{ °C}$ | 1500 | W |
| $T_{stg}$    | Storage temperature range                             |             | -65 to + 175                              | °C   |   |
| $T_j$        | Maximum operating junction temperature <sup>(1)</sup> |             | 175                                       | °C   |   |

1.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid runaway for a diode on its own heatsink

**Table 3. Thermal resistance**

| Symbol        | Parameter        |                     | Value | Unit |
|---------------|------------------|---------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case | STmite/STmite flat  | 20    | °C/W |
| $R_{th(j-l)}$ | Junction to lead | SMA                 | 20    |      |
|               |                  | Lead length = 10 mm | DO-41 |      |

**Table 4. Static electrical characteristics**

| Symbol               | Parameter               | Tests conditions      |                    | Min. | Typ. | Max. | Unit |
|----------------------|-------------------------|-----------------------|--------------------|------|------|------|------|
| $I_R$ <sup>(1)</sup> | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$    |      | 0.2  | 1.0  | μA   |
|                      |                         | $T_j = 125\text{ °C}$ |                    |      | 0.2  | 1.0  | mA   |
| $V_F$ <sup>(2)</sup> | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 1\text{ A}$ |      | 0.78 | 0.82 | V    |
|                      |                         | $T_j = 125\text{ °C}$ |                    |      | 0.62 | 0.67 |      |
|                      |                         | $T_j = 25\text{ °C}$  | $I_F = 2\text{ A}$ |      | 0.85 | 0.89 |      |
|                      |                         | $T_j = 125\text{ °C}$ |                    |      | 0.69 | 0.75 |      |

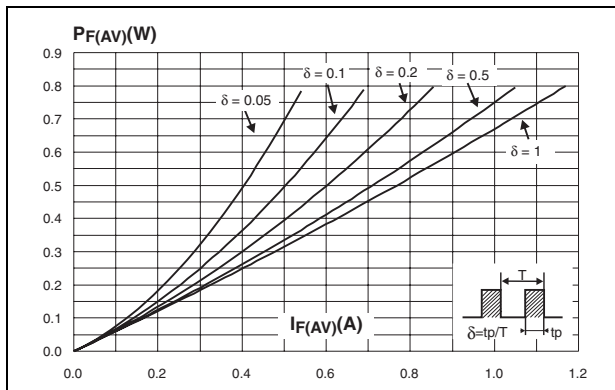
1.  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2.  $t_p = 380\text{ μs}$ ,  $\delta < 2\%$

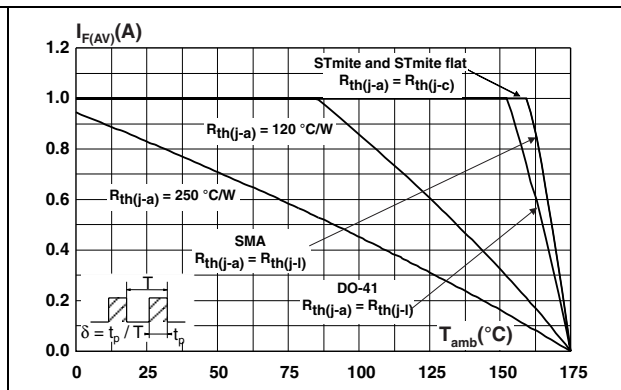
To evaluate the conduction losses use the following equation:

$$P = 0.59 \times I_{F(AV)} + 0.08 I_{F(RMS)}^2$$

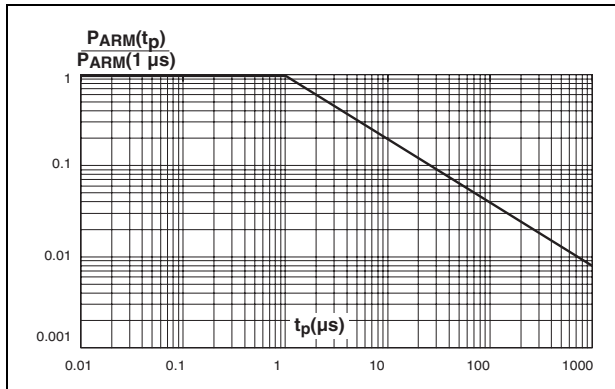
**Figure 1. Average forward power dissipation versus average forward current**



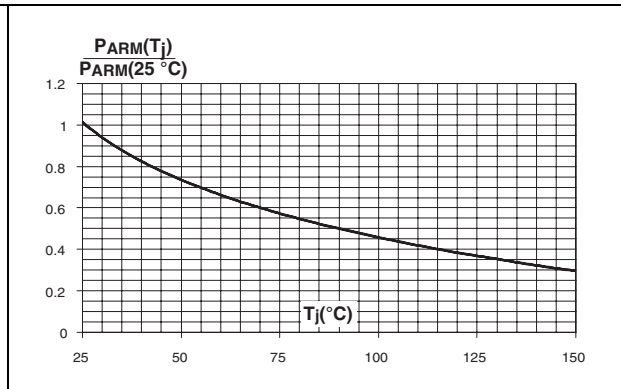
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ )**



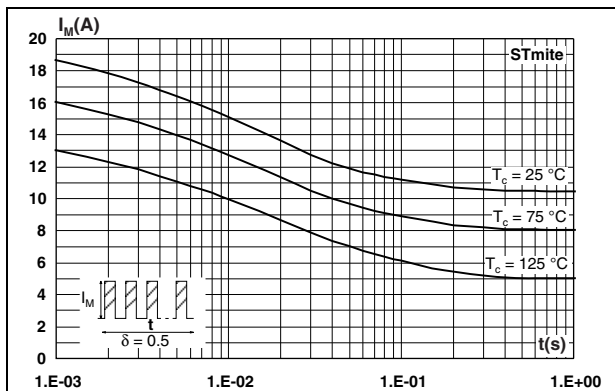
**Figure 3. Normalized avalanche power derating versus pulse duration**



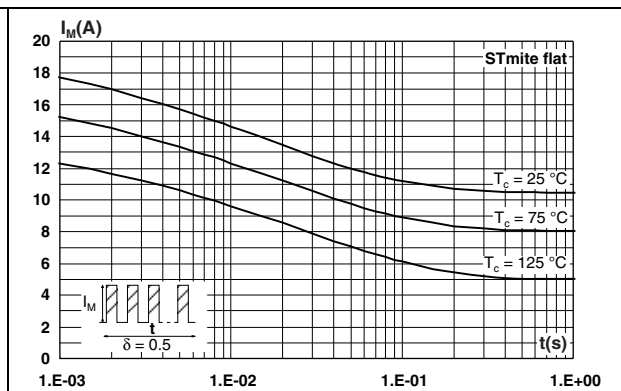
**Figure 4. Normalized avalanche power derating versus junction temperature**



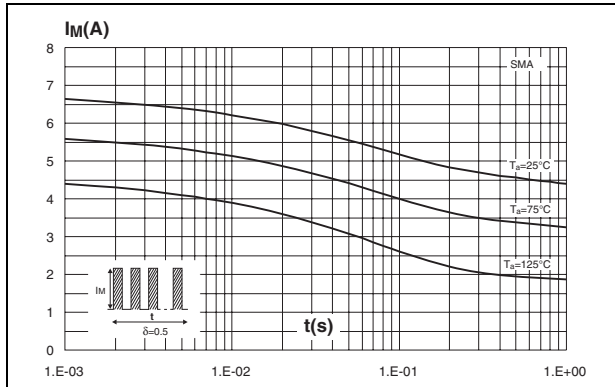
**Figure 5. Non repetitive surge peak forward current versus overload duration - maximum values**



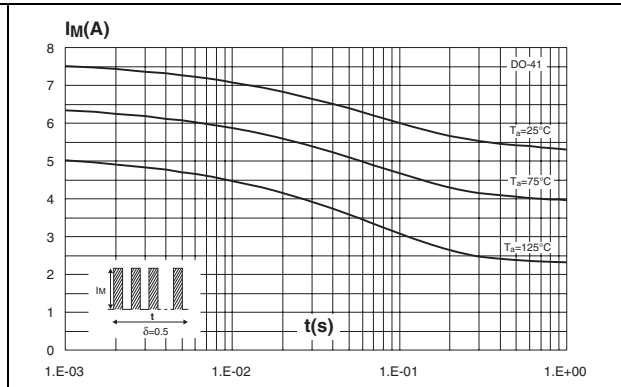
**Figure 6. Non repetitive surge peak forward current versus overload duration - maximum values**



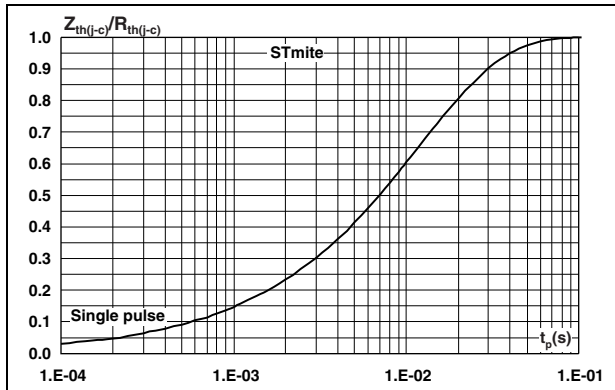
**Figure 7. Non repetitive surge peak forward current versus overload duration - maximum values**



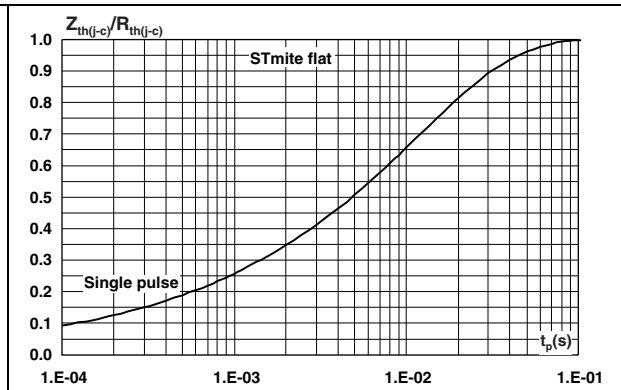
**Figure 8. Non repetitive surge peak forward current versus overload duration - maximum values**



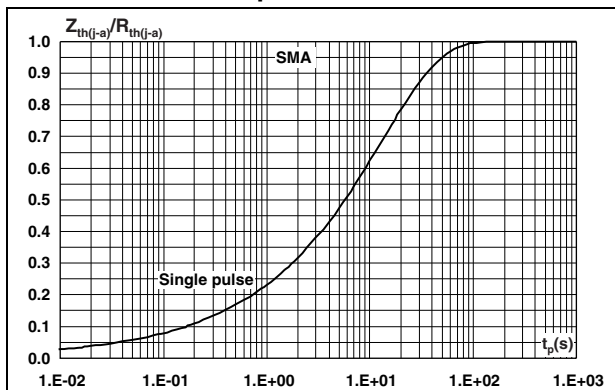
**Figure 9. Relative variation of thermal impedance junction to case versus pulse duration**



**Figure 10. Relative variation of thermal impedance junction to case versus pulse duration**



**Figure 11. Relative variation of thermal impedance junction to ambient versus pulse duration**



**Figure 12. Relative variation of thermal impedance junction to ambient versus pulse duration**

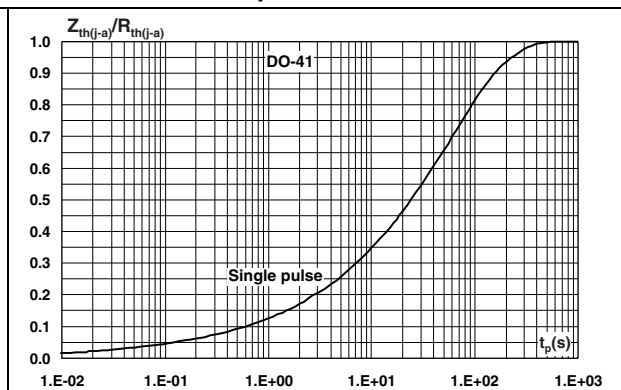


Figure 13. Reverse leakage current versus reverse voltage applied (typical values)

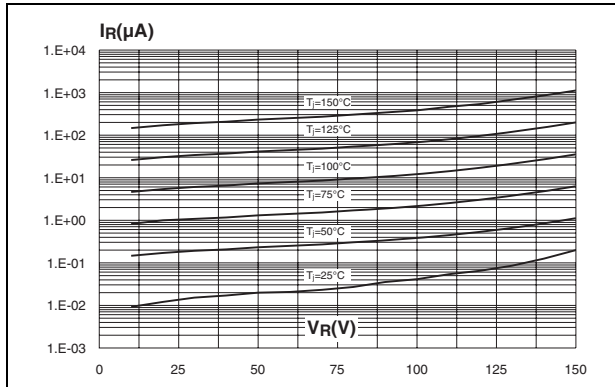


Figure 14. Junction capacitance versus reverse voltage applied (typical values)

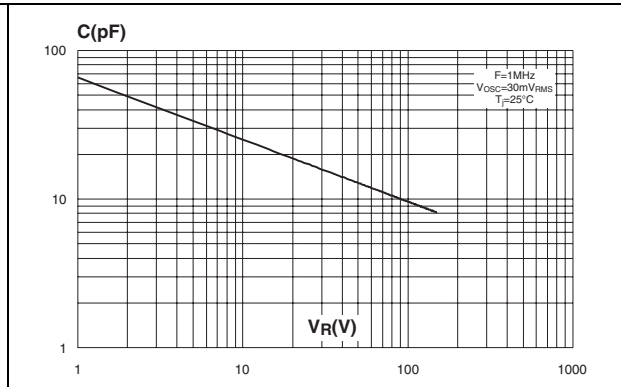


Figure 15. Forward voltage drop versus forward current (all packages)

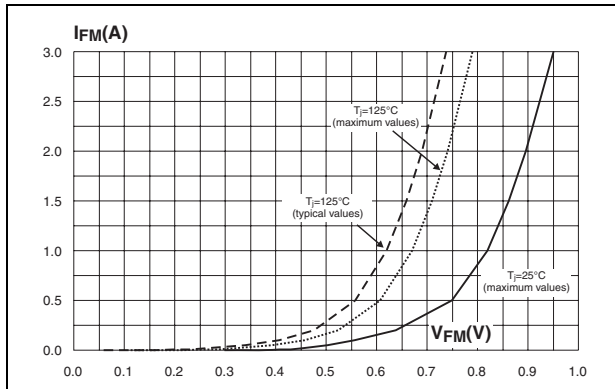


Figure 16. Thermal resistance junction to ambient versus copper surface under tab (STmite)

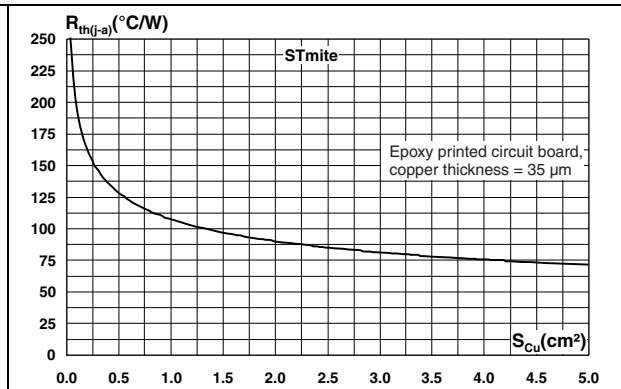


Figure 17. Thermal resistance junction to ambient versus copper surface under tab (STmite flat)

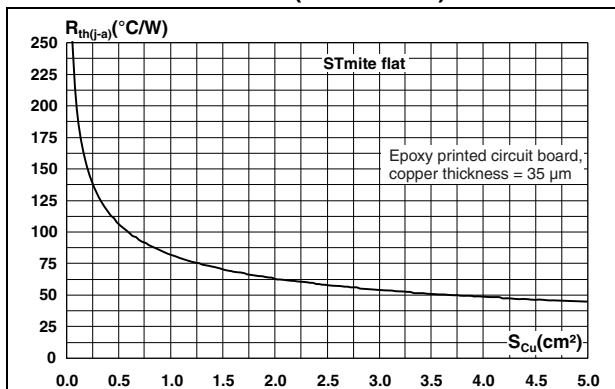


Figure 18. Thermal resistance junction to ambient versus copper surface under each lead (SMA)

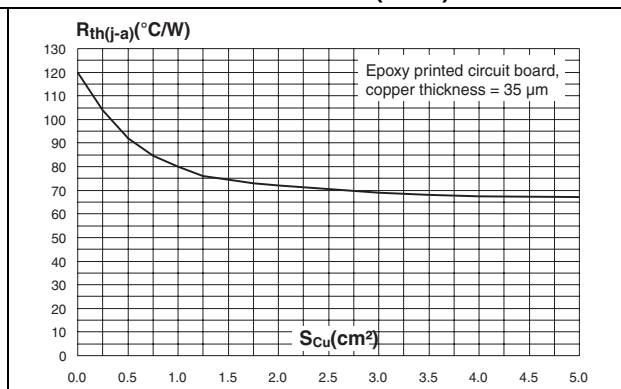
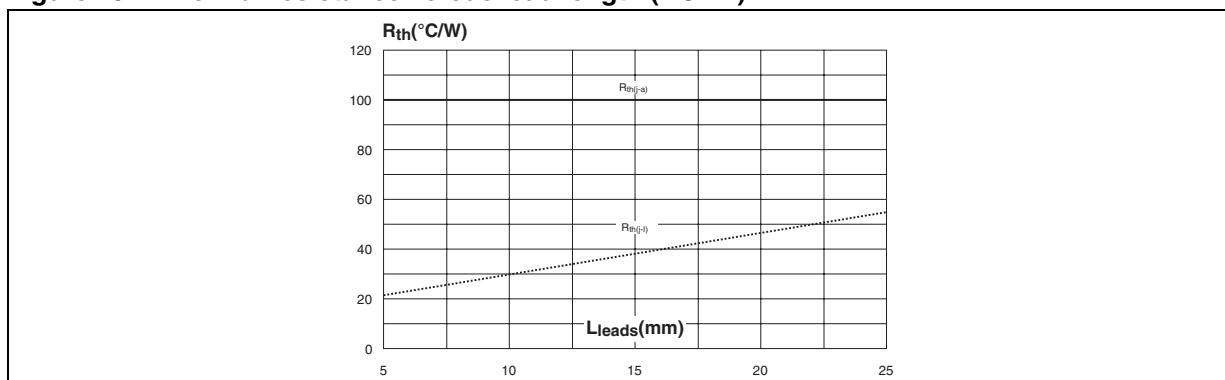


Figure 19. Thermal resistance versus lead length (DO-41)



## 2 Package information

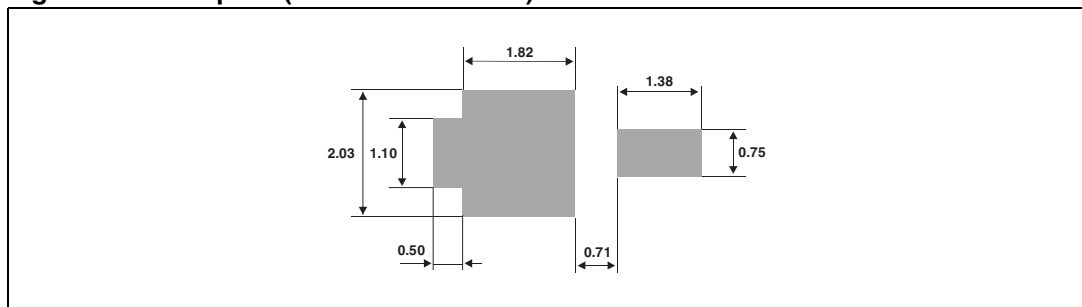
- Band shows cathode.
- Epoxy meets UL94, V0

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

**Table 5. STmite dimensions**

| Ref. | Dimensions  |             |       |        |              |       |
|------|-------------|-------------|-------|--------|--------------|-------|
|      | Millimeters |             |       | Inches |              |       |
|      | Min.        | Typ.        | Max.  | Min.   | Typ.         | Max.  |
| A    | 0.85        | 1.00        | 1.15  | 0.033  | 0.039        | 0.045 |
| A1   | -0.05       |             | 0.105 | -0.002 |              | 0.004 |
| b    | 0.40        |             | 0.65  | 0.016  |              | 0.025 |
| b2   | 0.70        |             | 1.00  | 0.027  |              | 0.039 |
| c    | 0.10        |             | 0.25  | 0.004  |              | 0.010 |
| D    | 1.75        | 1.90        | 2.05  | 0.069  | 0.007        | 0.081 |
| E    | 1.75        | 1.90        | 2.05  | 0.069  | 0.007        | 0.081 |
| H    | 3.60        | 3.75        | 3.90  | 0.142  | 0.148        | 0.154 |
| L    | 0.50        | 0.63        | 0.80  | 0.047  | 0.025        | 0.031 |
| L2   | 1.20        | 1.35        | 1.50  | 0.047  | 0.053        | 0.059 |
| L3   |             | 0.50<br>ref |       |        | 0.019<br>ref |       |
| R    | 0.07        |             |       | 0.003  |              |       |
| R1   | 0.07        |             |       | 0.003  |              |       |

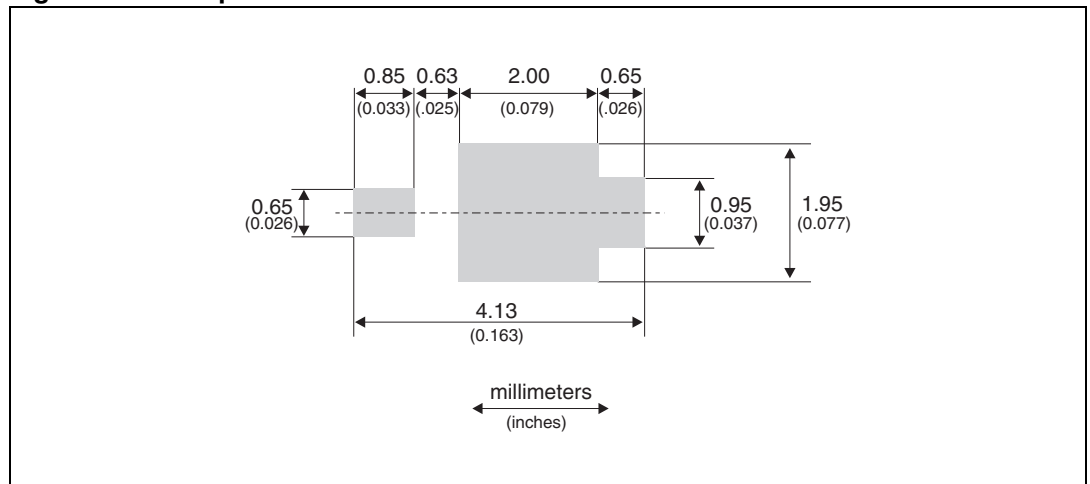
**Figure 20. Footprint (dimensions in mm)**



**Table 6. 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 21. Footprint dimensions**

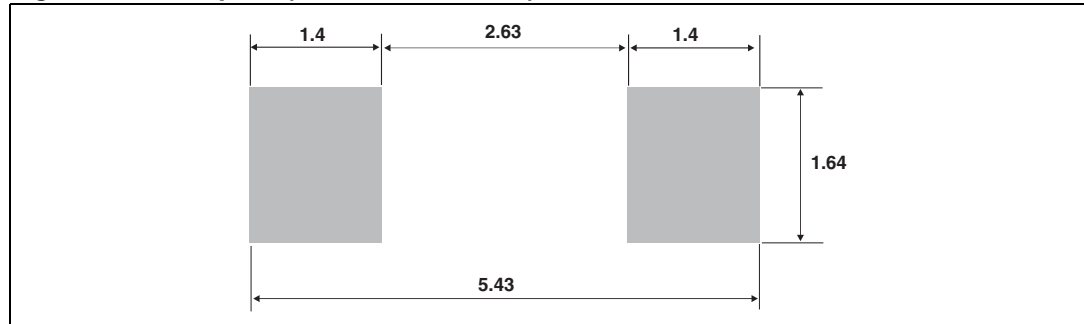




**Table 7. SMA dimensions**

| 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 22. Footprint (dimensions in mm)**



**Table 8. DO-41 (plastic) dimensions**

| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 4.1         | 5.20  | 0.160  | 0.205 |
| B    | 2           | 2.71  | 0.080  | 0.107 |
| C    | 25.4        |       | 1      |       |
| D    | 0.712       | 0.863 | 0.028  | 0.034 |

### 3 Ordering information

**Table 9. Ordering information**

| Order code | Marking  | Package     | Weight   | Base qty | Delivery mode |
|------------|----------|-------------|----------|----------|---------------|
| STPS1150M  | 115      | STmite      | 0.0155 g | 12000    | Tape and reel |
| STPS1150MF | F115     | STmite flat | 0.016 g  | 12000    | Tape and reel |
| STPS1150A  | 1150     | SMA         | 0.068 g  | 5000     | Tape and reel |
| STPS1150   | STPS1150 | DO-41       | 0.34 g   | 2000     | Ammopack      |
| STPS1150RL | STPS1150 | DO-41       | 0.34 g   | 5000     | Tape and reel |

### 4 Revision history

**Table 10. Document revision history**

| Date        | Revision | Changes  |
|-------------|----------|--|
| Jul-2003    | 2A       | Last update.   |
| Aug-2004    | 3        | SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106) to 2.03mm (0.080).                              |
| 31-May-2006 | 4        | Reformatted to current standard. Added ECOPACK statement. Updated SMA footprint in Figure 15. Changed nF to pF in Figure 10. |
| 09-Feb-2011 | 5        | Added STmite and STmite flat package.  |

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