# ESDAxxxWx

## TRANSIL™ array for data protection

## Main applications

Where transient overvoltage protection in ESD sensitive equipment is required, such as :

- Computers
- Printers
- Communication systems
- Cellular phones handsets and accessories
- Wireline and wireless telephone sets
- Set top boxes

## Features

- 2 up to 5 Unidirectional Transil functions
- Breakdown voltage:
  $V_{BR}$ = 6.1 V min. and 25 V min.
- Low leakage current: < 1 µA
- Very small PCB area < 4.2 $mm^2$ typically

## Description

The ESDAxxxWx are monolithic suppressors designed to protect components connected to data and transmission lines against ESD.

These devices clamp the voltage just above the logic level supply for positive transients, and to a diode drop below ground for negative transients.

## Benefits

- High ESD protection level: up to 25 kV
- High integration

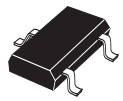
### Complies with the following standards

**IEC61000-4-2**

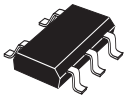
Level 4 15 kV (air discharge)
8 kV(contact discharge)

**MIL STD 883E - Method 3015-7 Class 3**

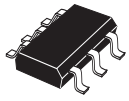
25 kV HBM (Human Body Model)



SOT323-3L



SOT323-5L

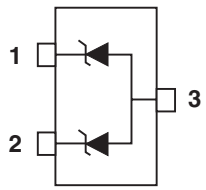


SOT323-6L

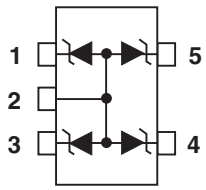
### Order codes

| Part Numbers | Marking |
|---|---|
| ESDA6V1W5 | E61 |
| ESDA6V1-5W6 | E62 |
| ESDA25W | E25 |
| ESDA25W5 | E25 |

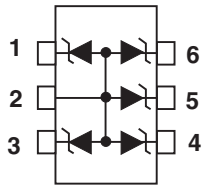
### ESDA25W Functional diagram




### ESDA6V1W5/ESDA25W5 Functional diagram




### ESDA6V1-5W6 Functional diagram



# 1 Characteristics

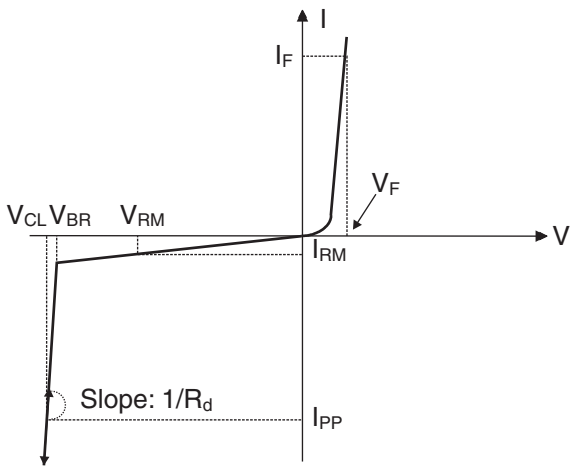
**Table 1. Absolute Ratings ($T_{amb}$ = 25°C)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $P_{PP}$ | Peak pulse power (8/20 µs) | ESDA25W | 400 | W |
| | | ESDA25W5 / ESDA6V1W5 | 150 | |
| | | ESDA6V1-5W6 | 100 | |
| $T_j$ | Junction temperature | | 125 | °C |
| $T_{stg}$ | Storage temperature range | | -55 to +150 | °C |
| $T_L$ | Maximum lead temperature for soldering during 10s | | 260 | °C |
| $T_{op}$ | Operating temperature range(1) | ESDA25W / ESDA25W5 / ESDA6V1W5 | -40 to +125 | °C |
| | | ESDA6V1-5W6 | -40 to +125 | |

1. The values of the operating parameters versus temperature are given through curves and αT parameter.

## 1.1 Electrical Characteristics ($T_{amb}$ = 25°C)

| Symbol | Parameter |
|---|---|
| $V_{RM}$ | Stand-off voltage |
| $V_{BR}$ | Breakdown voltage |
| $V_{CL}$ | Clamping voltage |
| $I_{RM}$ | Leakage current |
| $I_{PP}$ | Peak pulse current |
| $I_R$ | Reverse leakage current |
| $I_F$ | Forward current |
| αT | Voltage temperature coefficient |
| $V_F$ | Forward voltage drop |
| C | Capacitance |
| $R_d$ | Dynamic resistance |



| Part Numbers | $V_{BR}$ | | | $I_{RM}$ @ $V_{RM}$ | | $V_F$ @ $I_F$ | | $R_d$ | $\alpha T$ | C |
|---|---|---|---|---|---|---|---|---|---|---|
| | min. | max. @ $I_R$ | | | | max. | | typ.(1) | max.(2) | typ. 0V bias |
| | V | V | mA | µA | V | V | mA | Ω | $10^{-4}$/°C | pF |
| ESDA25W | 25 | 30 | 1 | 1 | 24 | 1.2 | 10 | 1.1 | 10 | 65 |
| ESDA25W5 | 25 | 30 | 1 | 1 | 24 | 1.2 | 10 | 1.9 | 10 | 30 |
| ESDA6V1-5W6 | 6.1 | 7.2 | 1 | 1 | 3 | 1.25 | 200 | 0.61 | 6 | 50 |
| ESDA6V1W5 | 6.1 | 7.2 | 1 | 1 | 3 | 1.25 | 200 | 0.35 | 6 | 90 |

1. Square pulse $I_{pp}$ = 15 A, $t_p$ = 2.5 µs
2. $V_{BR}$ = aT* ($T_{amb}$ - 25 °C) * $V_{BR}$ (25 °C)

**Figure 1. Peak power dissipation versus initial junction temperature**

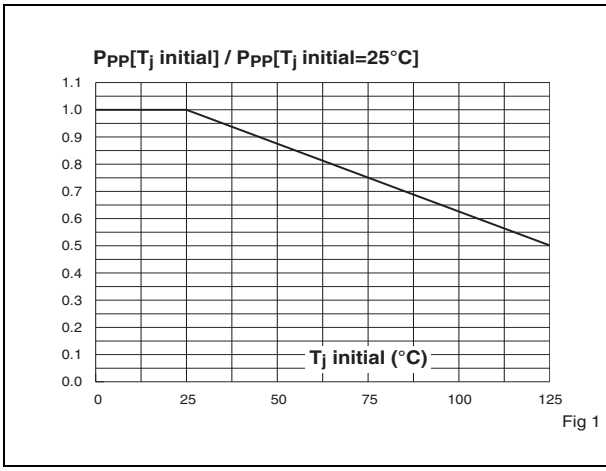



Fig 1

**Figure 2. Peak pulse power versus exponential pulse duration ($T_j$ initial = 25°C) (ESDA25W)**

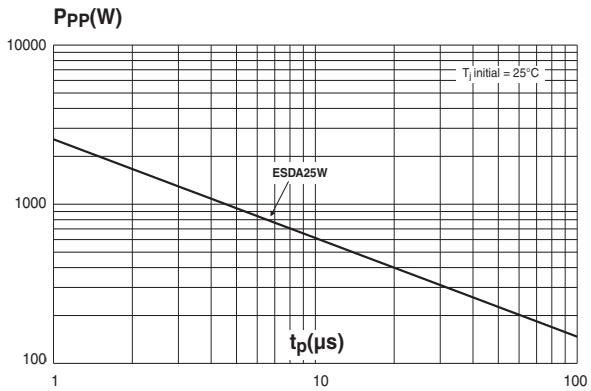


**Figure 3. Peak pulse power versus exponential pulse duration ($T_j$ initial = 25°C) (ESDA25W5 / ESDA6V1W5 / ESDA6V1-5W6)**

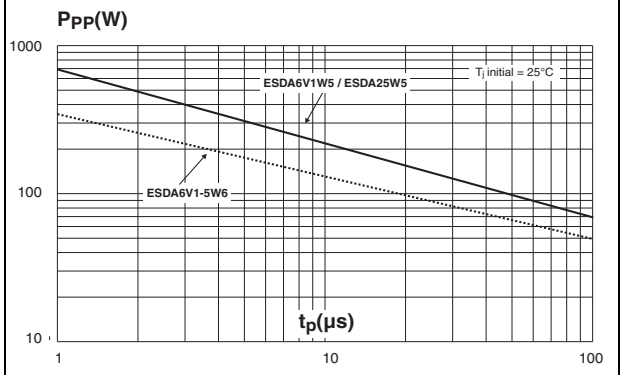



**Figure 4. Clamping voltage versus peak pulse current ($T_j$ initial = 25°C, rectangular waveform, $t_p$ = 2.5 µs) (ESDA25W / ESDA25W5)**

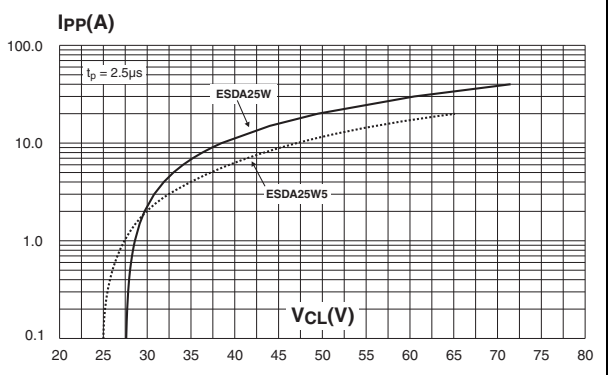



**Figure 5. Clamping voltage versus peak pulse current ($T_j$ initial = 25°C, rectangular waveform, $t_p$ = 2.5 µs) (ESDA6V1W5 / ESDA6V1-5W6)**

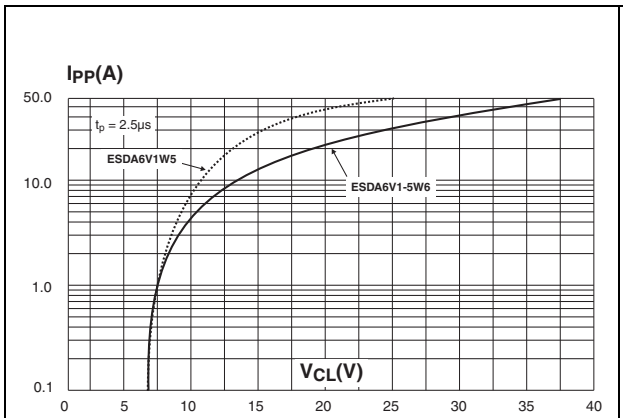



**Figure 6. Capacitance versus reverse applied voltage (typical values) (ESDA25W / ESDA25W5)**

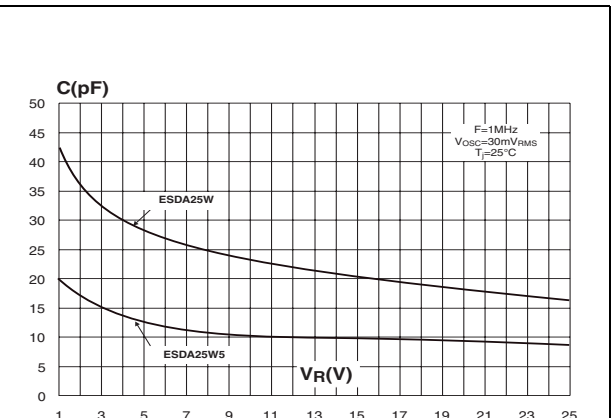


**Figure 7. Capacitance versus reverse applied voltage (typical values) (ESDA6V1W5 / ESDA6V1-5W6)**

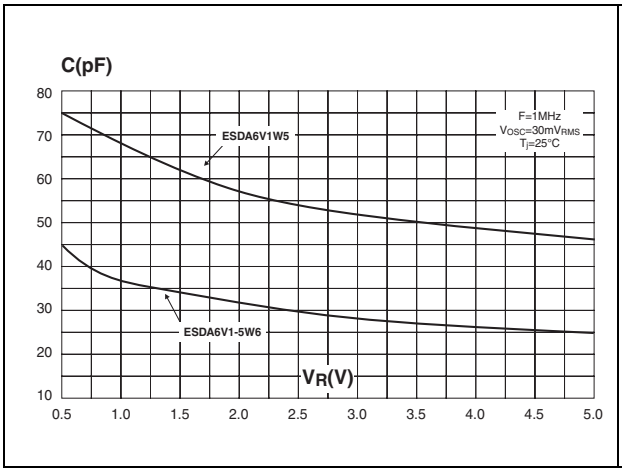



**Figure 8. Relative variation of leakage current versus junction temperature (typical values)**

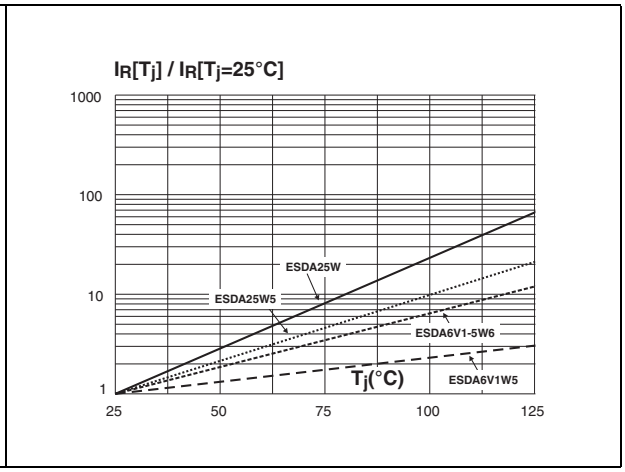



**Figure 9. Peak forward voltage drop versus peak forward current (typical values) (ESDA25W / ESDA25W5)**

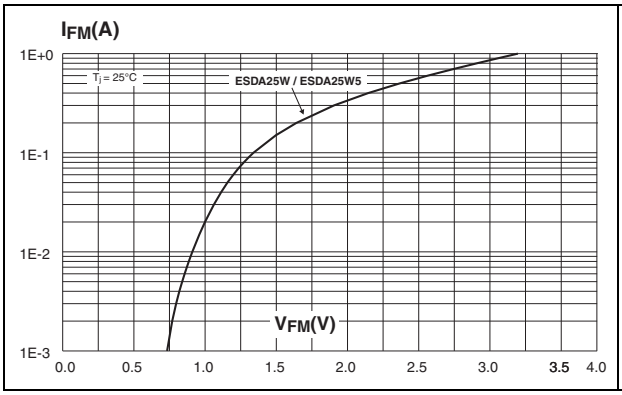



**Figure 10. Peak forward voltage drop versus peak forward current (typical values) (ESDA6V1W5 / ESDA6V1-5W6)**

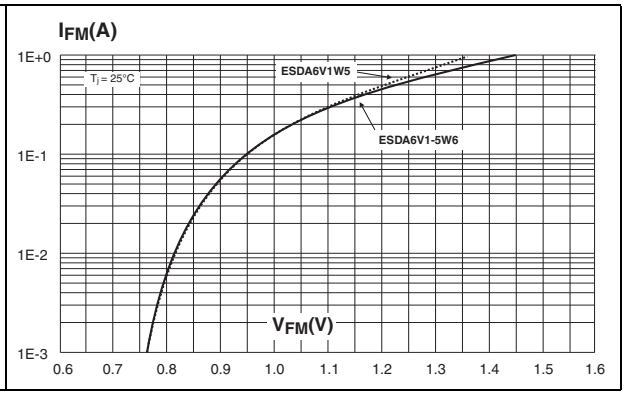
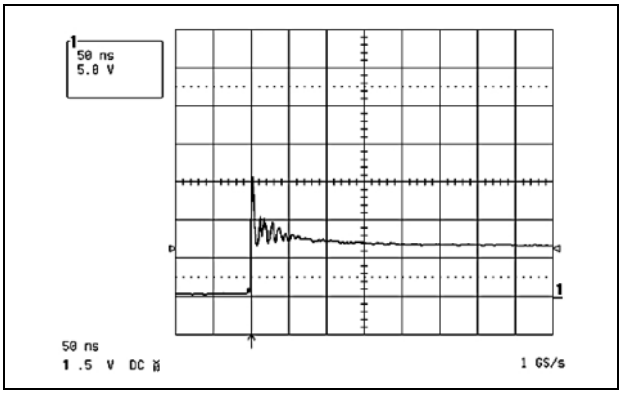
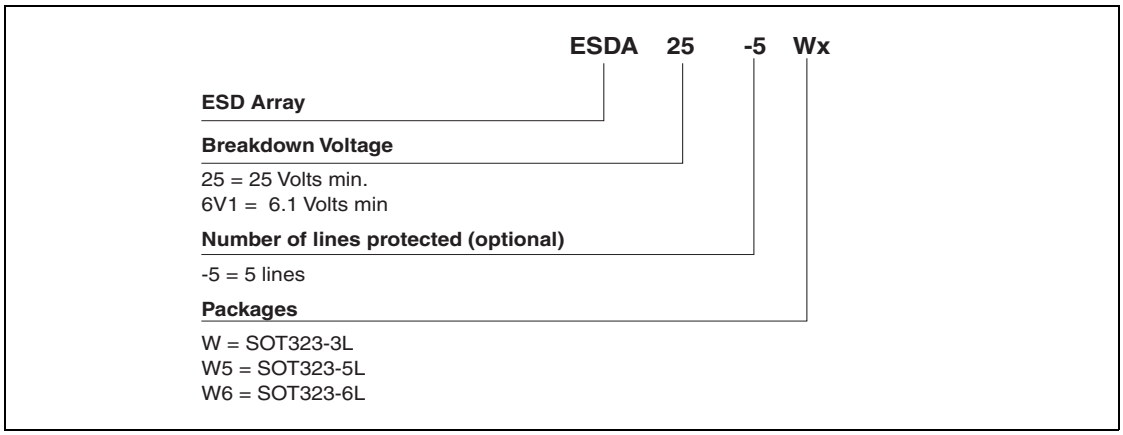



**Figure 11. ESD response to IEC61000-4-2 (air discharge 15 kV, positive surge)**

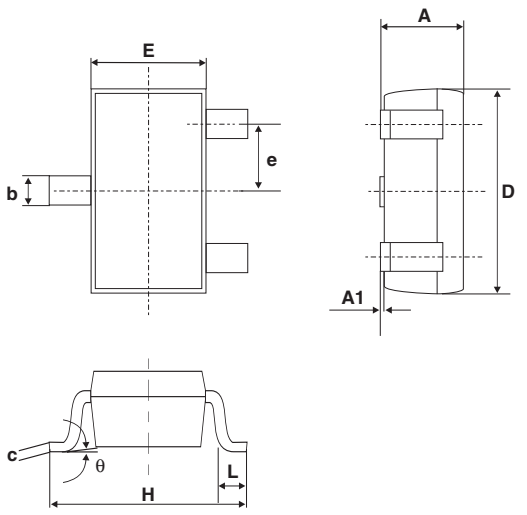


# 2 Ordering information scheme



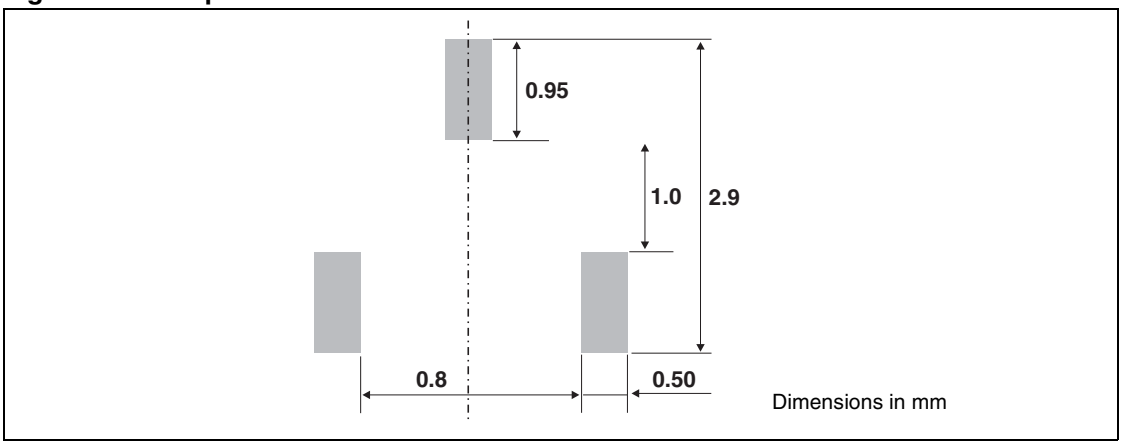
# 3 Package mechanical data

## 3.1 SOT323-3L package

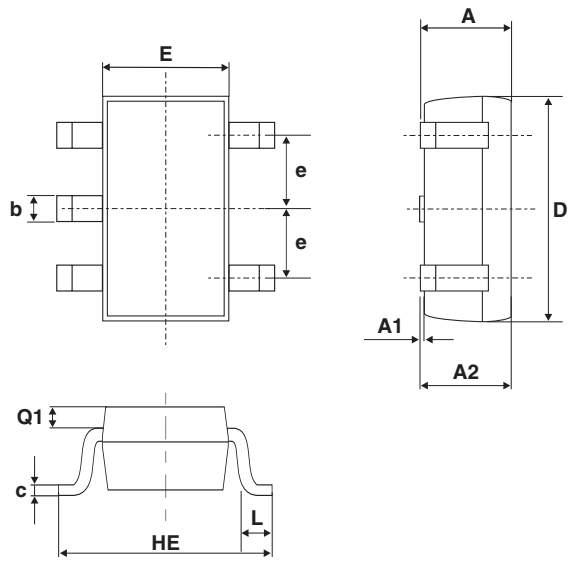



| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.8 | | 1.1 | 0.031 | | 0.043 |
| A1 | 0.0 | | 0.1 | 0.0 | | 0.004 |
| b | 0.25 | | 0.4 | 0.010 | | 0.016 |
| c | 0.1 | | 0.26 | 0.004 | | 0.010 |
| D | 1.8 | 2.0 | 2.2 | 0.071 | 0.079 | 0.086 |
| E | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | | 0.65 | | | 0.026 | |
| H | 1.8 | 2.1 | 2.4 | 0.071 | 0.083 | 0.094 |
| L | 0.1 | 0.2 | 0.3 | 0.004 | 0.008 | 0.012 |
| q | 0 | | 30° | 0 | | 30° |

**Figure 12. Footprint dimensions**

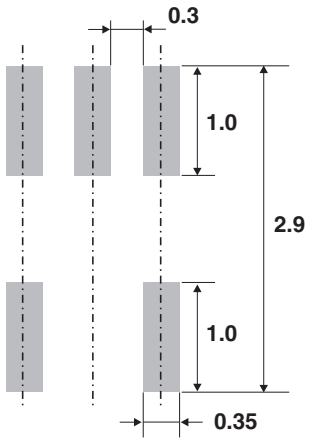


## 3.2 SOT323-5L package



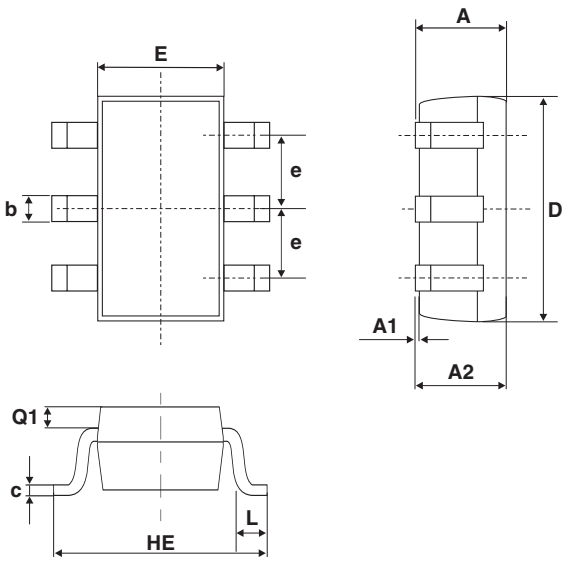

| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.8 | 1.1 | 0.031 | 0.043 |
| A1 | 0 | 0.1 | 0 | 0.004 |
| A2 | 0.8 | 1 | 0.031 | 0.039 |
| b | 0.15 | 0.3 | 0.006 | 0.012 |
| c | 0.1 | 0.18 | 0.004 | 0.007 |
| D | 1.8 | 2.2 | 0.071 | 0.086 |
| E | 1.15 | 1.35 | 0.045 | 0.053 |
| e | 0.65 Typ. | | 0.025 Typ. | |
| H | 1.8 | 2.4 | 0.071 | 0.094 |
| Q1 | 0.1 | 0.4 | 0.004 | 0.016 |

**Figure 13. Footprint dimensions**



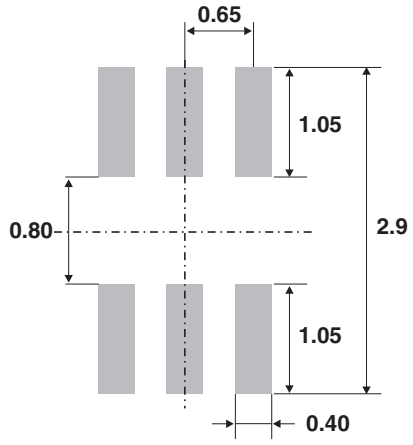

Dimensions in mm

## 3.3 SOT323-6L package




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.8 | 1.1 | 0.031 | 0.043 |
| A1 | 0 | 0.1 | 0 | 0.004 |
| A2 | 0.8 | 1 | 0.031 | 0.039 |
| b | 0.15 | 0.3 | 0.006 | 0.012 |
| c | 0.1 | 0.18 | 0.004 | 0.007 |
| D | 1.8 | 2.2 | 0.071 | 0.086 |
| E | 1.15 | 1.35 | 0.045 | 0.053 |
| e | 0.65 Typ. | | 0.025 Typ. | |
| H | 1.8 | 2.4 | 0.071 | 0.094 |
| Q | 0.1 | 0.4 | 0.004 | 0.016 |

**Figure 14. Footprint dimensions**



# 4 Ordering information

| Part Number | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| ESDA6V1W5 | E61 | SOT323-5L | 6 mg | 3000 | Tape & reel |
| ESDA6V1-5W6 | E62 | SOT323-6L | | | |
| ESDA25W | E25 | SOT323-3L | | | |
| ESDA25W5 | E25 | SOT323-5L | | | |

# 5 Revision history

| Date | Revision | Changes |
|---|---|---|
| 20-Jul-2005 | 1 | Initial release |
| 29-Aug-2005 | 2 | Added notes to table on page2, removed annotations in Figure 1. |

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics.
All other names are the property of their respective owners

© 2005 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

**www.st.com**