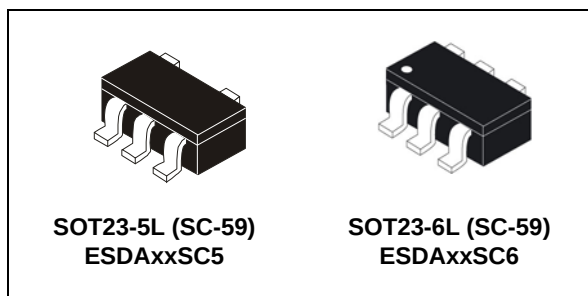


## Quad Transil™ array for ESD protection

Datasheet - production data



### Description

The ESDAxxSC5 and ESDAxxSC6 are monolithic voltage suppressors designed to protect components which are connected to data and transmission lines against ESD.

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

### Features

- 4 unidirectional ESD protection
- 400 W peak pulse power (8/20  $\mu$ s)
- Benefits
  - High ESD protection level: up to 30 kV
  - High integration
  - Suitable for high density boards
- Complies with the following standards
  - IEC 61000-4-2 level exceed level 4:
  - 30 kV (air discharge)
  - 30 kV (contact discharge)
- MIL STD 883E- Method 3015-7: class3B
  - human body model

Figure 1. ESDAxxSC5 functional diagram

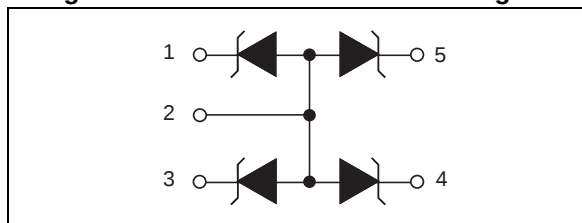
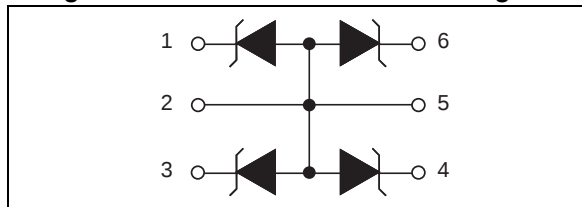


Figure 2. ESDAxxSC6 functional diagram



### Applications

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

- Computers
- Printers
- Communication systems
- Cellular phone handsets and accessories
- Other telephone set
- Set top boxes

Table 1. Device summary

| Order code  | V <sub>BR</sub> min. | Package  |
|-------------|----------------------|----------|
| ESDA5V3SC5  | 5.3 V                | SOT23-5L |
| ESDA5V3SC6  | 5.3 V                | SOT23-6L |
| ESDA6V1SC5  | 6.1 V                | SOT23-5L |
| ESDA6V1SC6  | 6.1 V                | SOT23-6L |
| ESDA14V2SC5 | 14.2 V               | SOT23-5L |
| ESDA14V2SC6 | 14.2 V               | SOT23-6L |
| ESDA19SC6   | 19 V                 | SOT23-6L |
| ESDA25SC6   | 25 V                 | SOT23-6L |

TM: Transil is a trademark of STMicroelectronics.

# 1 Characteristics

Table 2. Absolute ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

| Symbol    | Parameter                                          |                                                                                              | Value       | Unit               |
|-----------|----------------------------------------------------|----------------------------------------------------------------------------------------------|-------------|--------------------|
| $V_{PP}$  | ESD discharge                                      | MIL STD 883E - Method 3015-7<br>IEC61000-4-2 air discharge<br>IEC61000-4-2 contact discharge | 30          | kV                 |
| $P_{PP}$  | Peak pulse power (8/20 $\mu$ s)                    | ESDA5V3SCx<br>ESDA6V1SCx                                                                     | 300         | W                  |
|           |                                                    | ESDA14V2SCx<br>ESDA19SC6<br>ESDA25SC6                                                        | 400         | W                  |
| $I_{PP}$  | Peak pulse current                                 | ESDA5V3SCx                                                                                   | 22          | A                  |
|           |                                                    | ESDA6V1SCx                                                                                   | 18          |                    |
|           |                                                    | ESDA14V2SCx                                                                                  | 14          |                    |
|           |                                                    | ESDA19SC6                                                                                    | 13          |                    |
|           |                                                    | ESDA25SC6                                                                                    | 9           |                    |
| $T_{stg}$ | Storage temperature range                          |                                                                                              | -55 to +150 | $^{\circ}\text{C}$ |
| $T_L$     | Maximum lead temperature for soldering during 10 s |                                                                                              | 260         | $^{\circ}\text{C}$ |
| $T_{op}$  | Operating junction temperature range               |                                                                                              | -55 to +150 | $^{\circ}\text{C}$ |

Table 3. Electrical characteristics - definitions ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

| Symbol     | Parameter                       |  |
|------------|---------------------------------|--|
| $V_{RM}$   | Stand-off voltage               |  |
| $V_{BR}$   | Breakdown voltage               |  |
| $V_{CL}$   | Clamping voltage                |  |
| $I_{RM}$   | Leakage current @ $V_{RM}$      |  |
| $I_{PP}$   | Peak pulse current              |  |
| $\alpha T$ | Voltage temperature coefficient |  |
| $C$        | Capacitance                     |  |
| $R_d$      | Dynamic resistance              |  |
| $V_F$      | Forward voltage drop            |  |

Table 4. Electrical characteristics - values ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

| Order codes                | $V_{BR} @ I_R$ |      |    | $I_{RM} @ V_{RM}$ |      | $V_{CL} @ I_{PP}$ |    | $\alpha T$                 | $C$              | $V_F @ I_F$ |     |
|----------------------------|----------------|------|----|-------------------|------|-------------------|----|----------------------------|------------------|-------------|-----|
|                            | min.           | max. |    | max.              |      | max.              |    | max. <sup>(1)</sup>        | typ.<br>0 V bias | max.        |     |
|                            | V              | V    | mA | $\mu\text{A}$     | V    | V                 | A  | $10^{-4}/^{\circ}\text{C}$ | pF               | V           | mA  |
| ESDA5V3SC5<br>ESDA5V3SC6   | 5.3            | 5.9  | 1  | 2                 | 3    | 21                | 22 | 5                          | 320              | 1.25        | 200 |
| ESDA6V1SC5<br>ESDA6V1SC6   | 6.1            | 7.2  | 1  | 2                 | 5.25 | 19                | 18 | 6                          | 190              | 1.25        | 200 |
| ESDA14V2SC5<br>ESDA14V2SC6 | 14.2           | 15.8 | 1  | 5                 | 12   | 35                | 14 | 10                         | 100              | 1.25        | 200 |
| ESDA19SC6                  | 19             | 21   | 1  | 0.1               | 15   | 39                | 13 | 8.5                        | 80               | 1.2         | 10  |
| ESDA25SC6                  | 25             | 30   | 1  | 1                 | 24   | 51                | 9  | 10                         | 60               | 1.2         | 10  |

1.  $V_{BR} @ T_J = V_{BR} @ 25\text{ }^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$

Figure 3. Peak power dissipation versus initial junction temperature

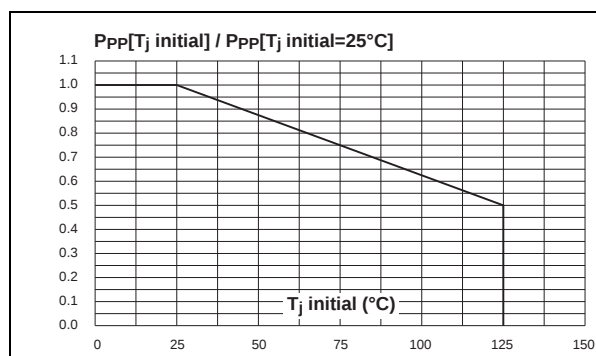
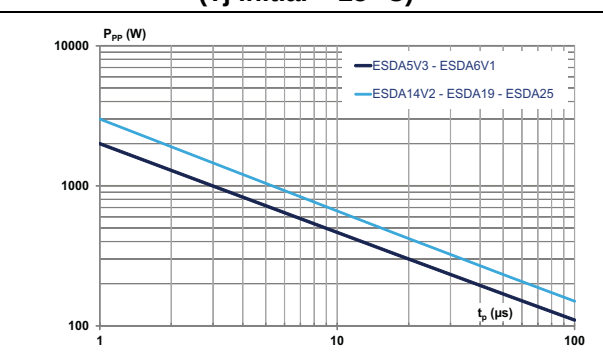
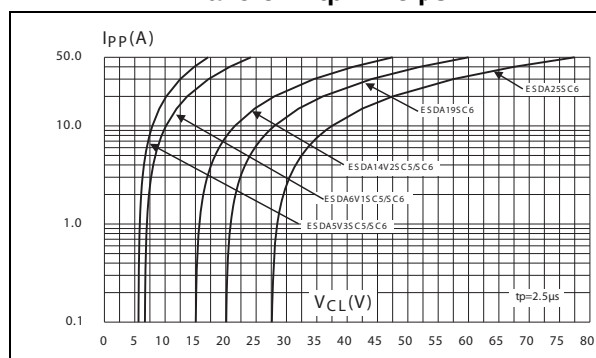
Figure 4. Peak pulse power versus exponential pulse duration ( $T_J \text{ initial} = 25\text{ }^{\circ}\text{C}$ )Figure 5. Clamping voltage versus peak pulse current ( $T_J \text{ initial} = 25\text{ }^{\circ}\text{C}$ ). Rectangular waveform  $t_p = 2.5\text{ }\mu\text{s}$ 

Figure 6. Capacitance versus reverse applied voltage

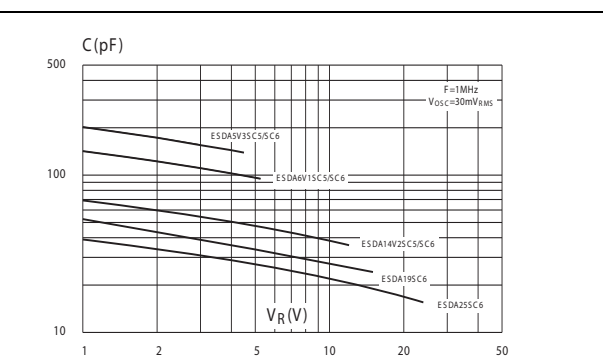


Figure 7. Relative variation of leakage current versus junction temperature

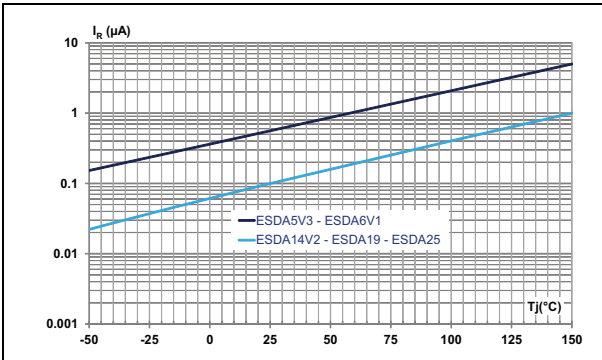
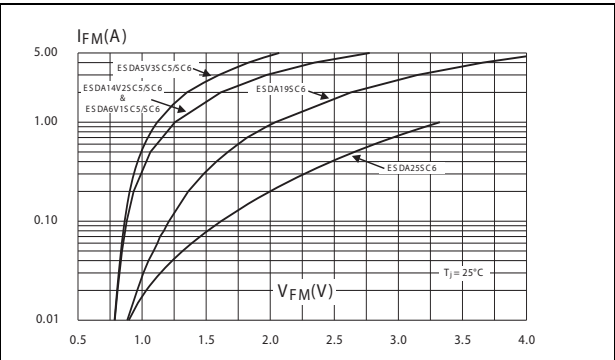
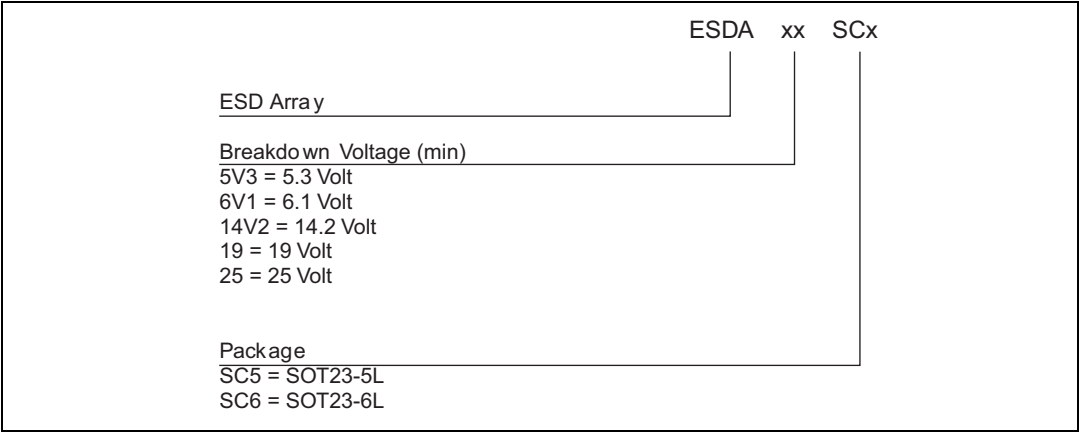


Figure 8. Peak forward voltage drop versus peak forward current



2      Ordering information

Figure 9. Ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0 standard

In order to meet environmental requirements, ST (also) offers these devices in ECOPACK® packages. ECOPACK® packages are Lead-free. The category of second level Interconnect is marked 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](http://www.st.com).

Table 5. SOT23-5L dimensions

| Ref. | Dimensions  |      |      |        |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Millimeters |      |      | Inches |       |       |
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    | 0.90        |      | 1.45 | 0.035  |       | 0.057 |
| A1   | 0           |      | 0.10 | 0      |       | 0.004 |
| A2   | 0.90        |      | 1.30 | 0.035  |       | 0.051 |
| b    | 0.35        |      | 0.50 | 0.014  |       | 0.020 |
| c    | 0.09        |      | 0.20 | 0.004  |       | 0.008 |
| D    | 2.80        |      | 3.05 | 0.11   |       | 0.118 |
| E    | 1.50        |      | 1.75 | 0.059  |       | 0.069 |
| e    |             | 0.95 |      |        | 0.037 |       |
| H    | 2.60        |      | 3.00 | 0.102  |       | 0.118 |
| L    | 0.10        |      | 0.60 | 0.004  |       | 0.024 |
| M    | 0°          |      | 10°  | 0°     |       | 10°   |

Figure 10. SOT23-5L footprint (dimensions in mm)

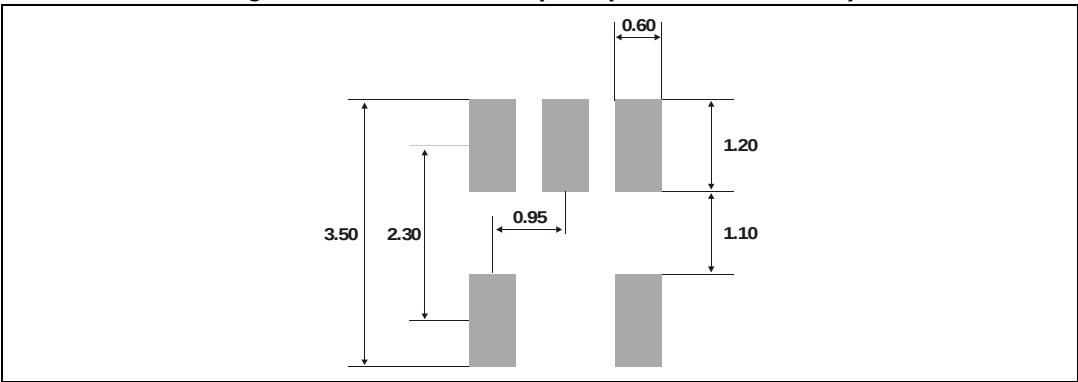
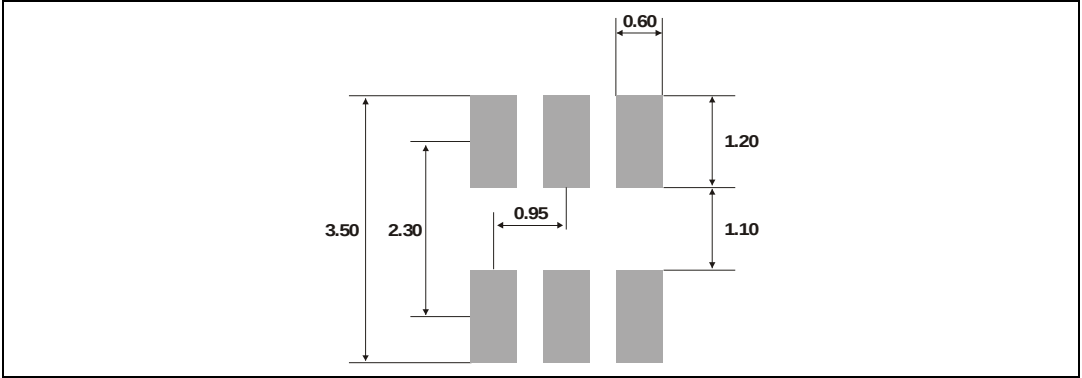


Table 6. SOT23-6L dimensions

| Ref. | Dimensions  |      |      |        |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Millimeters |      |      | Inches |       |       |
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    | 0.90        |      | 1.45 | 0.035  |       | 0.057 |
| A1   | 0           |      | 0.10 | 0      |       | 0.004 |
| A2   | 0.90        |      | 1.30 | 0.035  |       | 0.051 |
| b    | 0.35        |      | 0.50 | 0.014  |       | 0.020 |
| c    | 0.09        |      | 0.20 | 0.004  |       | 0.008 |
| D    | 2.80        |      | 3.05 | 0.11   |       | 0.118 |
| E    | 1.50        |      | 1.75 | 0.059  |       | 0.069 |
| e    |             | 0.95 |      |        | 0.037 |       |
| H    | 2.60        |      | 3.00 | 0.102  |       | 0.118 |
| L    | 0.10        |      | 0.60 | 0.004  |       | 0.024 |
| θ    | 0°          |      | 10°  | 0°     |       | 10°   |

Figure 11. SOT23-6L footprint (dimensions in mm)



## 4 Ordering information

Table 7. Ordering information

| Order codes | Marking | Package  | Weight  | Base qty | Delivery mode |
|-------------|---------|----------|---------|----------|---------------|
| ESDA5V3SC5  | EC53    | SOT23-5L | 16.7 mg | 3000     | Tape and reel |
| ESDA6V1SC5  | EC61    |          |         |          |               |
| ESDA14V2SC5 | EC15    |          |         |          |               |
| ESDA5V3SC6  | ES53    | SOT23-6L |         |          |               |
| ESDA6V1SC6  | ES61    |          |         |          |               |
| ESDA14V2SC6 | ES15    |          |         |          |               |
| ESDA19SC6   | ES19    |          |         |          |               |
| ESDA25SC6   | ES25    |          |         |          |               |

## 5 Revision history

Table 8. Document revision history

| Date        | Revision | Description of changes                                                                                                                                                                                                                                                                                                                                                 |
|-------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nov-2003    | 7F       | Previous issue.                                                                                                                                                                                                                                                                                                                                                        |
| 4-Nov-2004  | 8        | SOT23-6L package dimensions change for reference "D" from 3.0 millimeters (0.118 inches) to 3.05 millimeters (0.120 inches).                                                                                                                                                                                                                                           |
| 22-Nov-2007 | 9        | Reformatted to current standard. Units for $I_{RM}$ MAX in <a href="#">Table 4</a> corrected to $\mu A$ . <a href="#">Ordering information scheme</a> expanded to cover all devices. Package information for SOT23-5L updated.                                                                                                                                         |
| 17-Aug-2015 | 10       | Updated features on cover page.<br>Updated <a href="#">Table 2</a> , <a href="#">Table 4</a> , <a href="#">Figure 4</a> , <a href="#">Figure 5</a> , <a href="#">Figure 6</a> , <a href="#">Figure 7</a> , <a href="#">Figure 8</a> , <a href="#">Figure 9</a> and <a href="#">Table 7</a> .<br>Removed section "Application information" and "Technical information". |

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