



# ESDA6V1BC6

ASD™

## QUAD BIDIRECTIONAL TRANSIL™ SUPPRESSOR FOR ESD PROTECTION

### MAIN APPLICATIONS

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

- Computers
- Printers
- Communication systems
- Video equipment

This device is particularly adapted to the protection of symmetrical signals

### FEATURES

- 4 Bidirectional Transil functions
- ESD Protection for data, Signal and V<sub>CC</sub> Bus
- Stand off voltage range:  $\pm 5$  V
- Low leakage current  $< 1\mu\text{A}$
- Peak pulse power (8/20 $\mu\text{s}$ ); 80W

### DESCRIPTION

The ESDA6V1BC6 is a monolithic array designed to protect up to 4 lines in a bidirectional way against ESD transients.

The device is ideal for situations where board space is at a premium.

### BENEFITS

- High ESD protection level: up to 25kV
- High integration
- Suitable for high density boards

### COMPLIES WITH THE FOLLOWING STANDARDS:

- IEC61000-4-2 level 4:
  - 15kV (air discharge)
  - 8kV (contact discharge)
- MIL STD 883E-Method 3015-6: class3  
(Human Body Model)

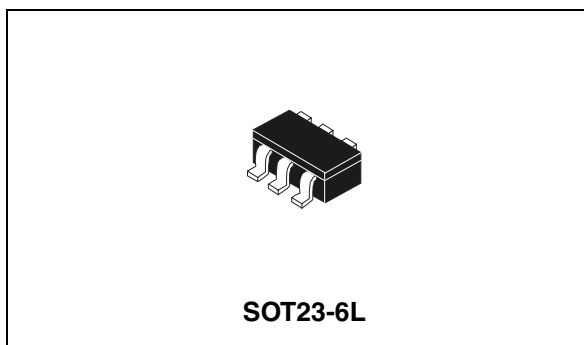
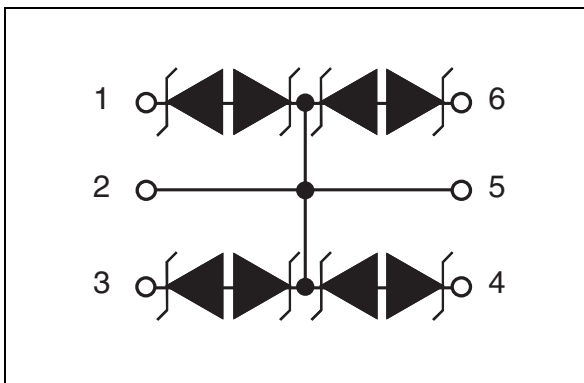


Table 1: Order Code

| Part Number | Marking |
|-------------|---------|
| ESDA6V1BC6  | BS55    |

Figure 1: Functional Diagram



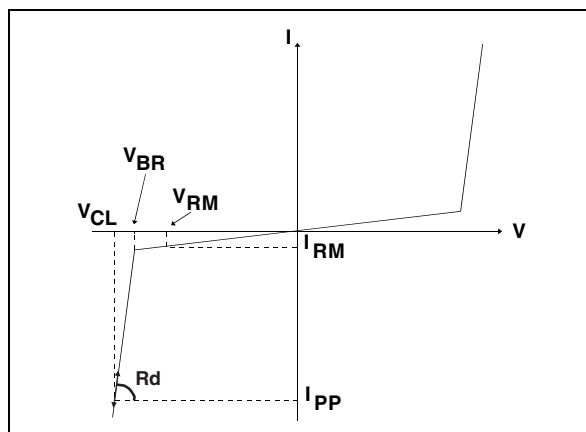
**Table 2: Absolute Maximum Ratings** ( $T_{amb} = 25^{\circ}\text{C}$ )

| Symbol    | Parameter                                                          |                                                                                              | Value         | Unit               |
|-----------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------|--------------------|
| $V_{PP}$  | ESD discharge                                                      | MIL STD 883C - Method 3015-6<br>IEC61000-4-2 air discharge<br>IEC61000-4-2 contact discharge | 25<br>15<br>8 | kV                 |
| $P_{PP}$  | Peak pulse power (8/20 $\mu\text{s}$ )                             |                                                                                              | 80            | W                  |
| $T_j$     | Junction temperature                                               |                                                                                              | 150           | $^{\circ}\text{C}$ |
| $T_{stg}$ | Storage temperature range                                          |                                                                                              | -55 to +150   | $^{\circ}\text{C}$ |
| $T_L$     | Maximum lead temperature for soldering during 10 s at 5mm for case |                                                                                              | 260           | $^{\circ}\text{C}$ |
| $T_{op}$  | Operating temperature range (note 1)                               |                                                                                              | -40 to +125   | $^{\circ}\text{C}$ |

**Note 1:** Variation of parameters is given by curves.

**Table 3: Electrical Characteristics** ( $T_{amb} = 25^{\circ}\text{C}$ )

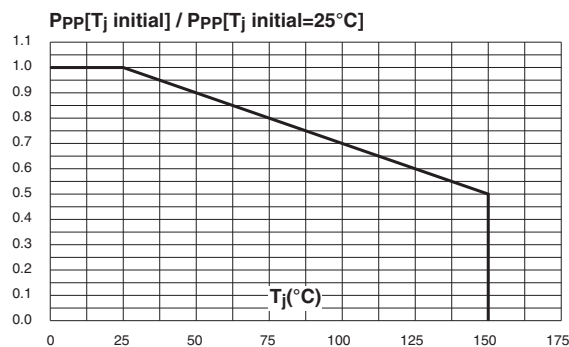
| Symbol     | Parameter                       |
|------------|---------------------------------|
| $V_{RM}$   | Stand-off voltage               |
| $V_{BR}$   | Breakdown voltage               |
| $V_{CL}$   | Clamping voltage                |
| $I_{RM}$   | Leakage current                 |
| $I_{PP}$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



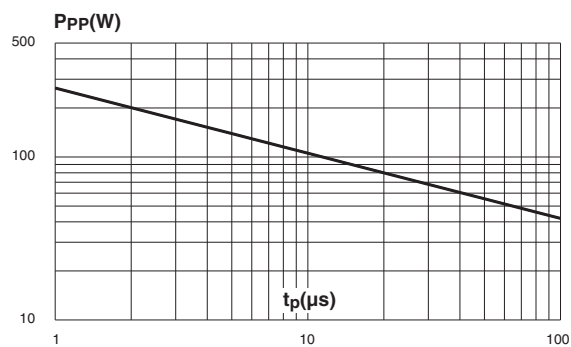
| Type       | $V_{BR}$ @ |      | $I_R$ | $I_{RM}$ @ $V_{RM}$ |   | $R_d$<br>typ.<br>note 2 | $\alpha T$<br>max.         | $C$<br>typ.<br>0V bias |
|------------|------------|------|-------|---------------------|---|-------------------------|----------------------------|------------------------|
|            | min.       | max. |       | max.                |   |                         |                            |                        |
|            | V          | V    |       | $\mu\text{A}$       | V | $\Omega$                | $10^{-4}/^{\circ}\text{C}$ | pF                     |
| ESDA6V1BC6 | 6.1        | 8    | 1     | 1                   | 5 | 1.35                    | 3                          | 20                     |

**Note 2:** Square pulse,  $I_{PP} = 3\text{A}$ ,  $t_p = 2.5\mu\text{s}$ .

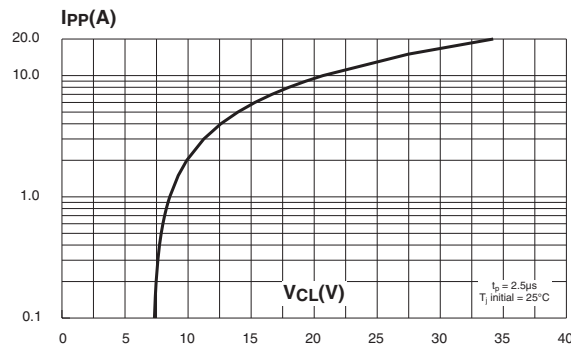
**Figure 2: Relative variation of peak pulse power versus initial junction temperature**



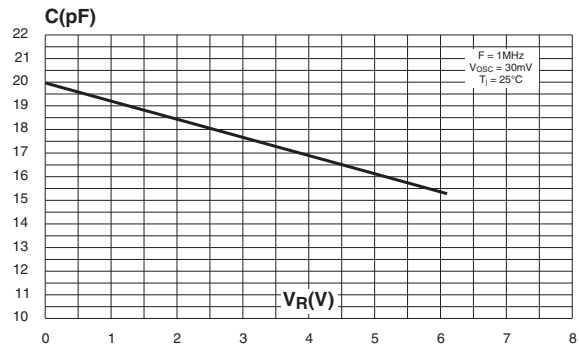
**Figure 3: Peak pulse power versus exponential pulse duration**



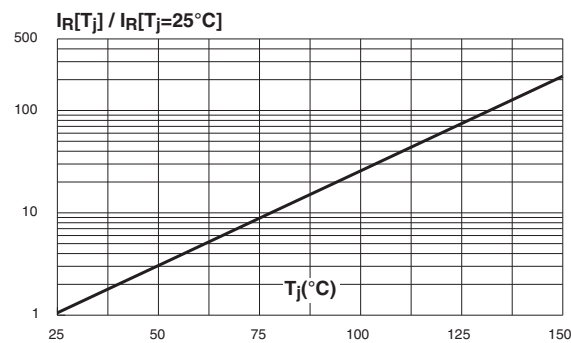
**Figure 4: Clamping voltage versus peak pulse current (typical values, rectangular waveform)**



**Figure 5: Junction capacitance versus line voltage applied (typical values)**



**Figure 6: Relative variation of leakage current versus junction temperature (typical values)**



## 1. ESD protection by ESDA6V1-4BC6

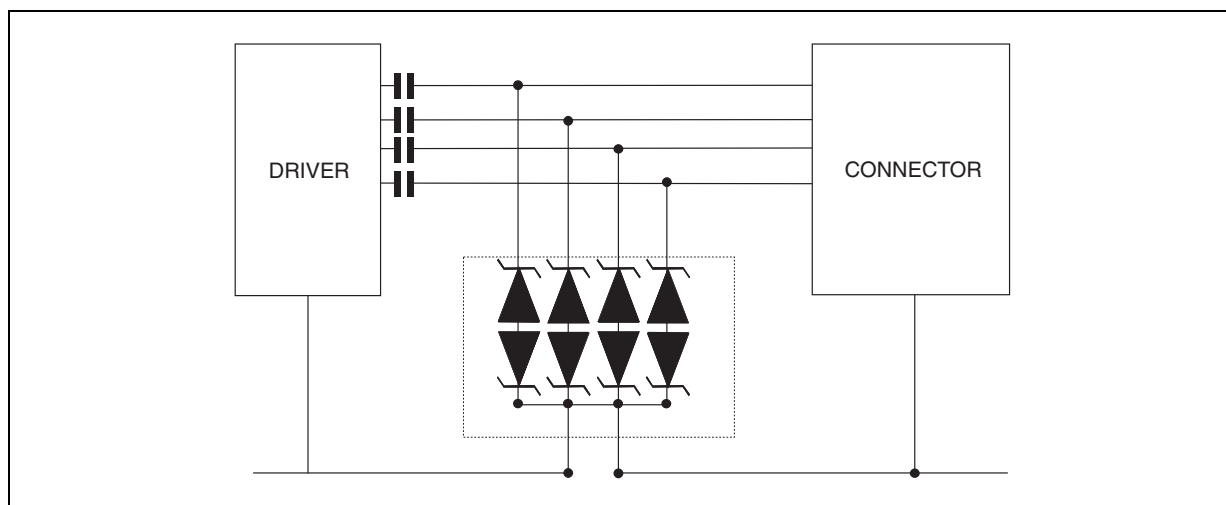
With the focus of lowering the operation levels, the problem of malfunction caused by the environment is critical. Electrostatic discharge (ESD) is a major cause of failure in electronic system.

Transient Voltage Suppressors are an ideal choice for ESD protection and have proven capable in suppressing ESD events. They are capable of clamping the incoming transient to a low enough level such that damage to the protected semiconductor is prevented.

Surface mount TVS arrays offer the best choice for minimal lead inductance.

They serve as parallel protection elements, connected between the signal line to ground. As the transient rises above the operating voltage of the device, the TVS array becomes a low impedance path diverting the transient current to ground.

**Figure 7: Bidirectional protection for 0V biased signals**



The ESDA6V1BC6 array is the ideal product for use as board level protection of ESD sensitive semiconductor components.

The tiny SOT23-6L package allows design flexibility in the design of “crowded” boards where the space saving is at a premium. This enables to shorten the routing and can contribute to improve ESD performance.

## 2. Circuit Board Layout

Circuit board layout is a critical design step in the suppression of ESD induced transients. The following guidelines are recommended :

- The ESDA6V1BC6 should be placed as near as possible to the input terminals or connectors.
- Minimise the path length between the ESD suppressor and the protected device
- Minimise all conductive loops, including power and ground loops
- The ESD transient return path to ground should be kept as short as possible.
- Use ground planes whenever possible.

**Figure 8: Ordering information scheme**

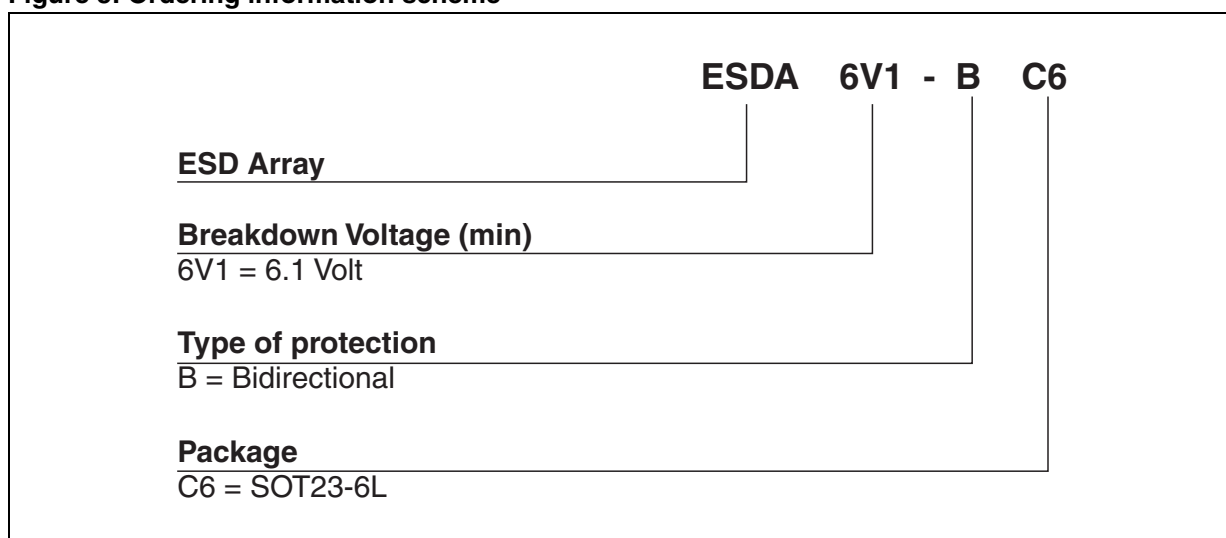


Figure 9: SOT23-6L Package Mechanical Data

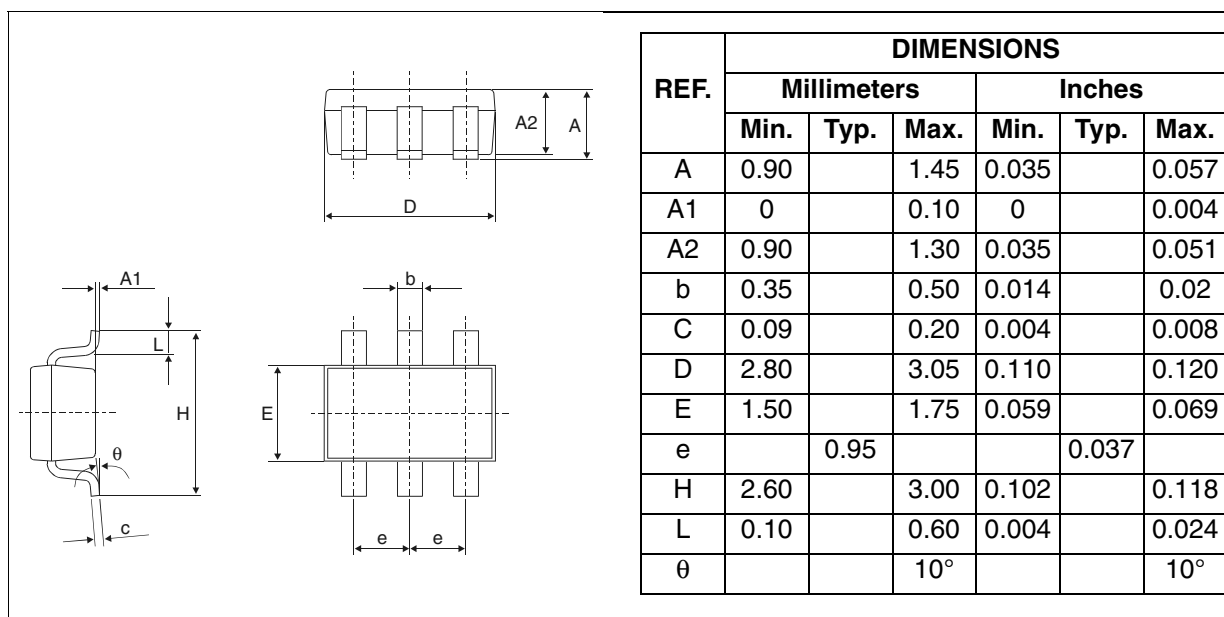


Figure 10: Foot Print Dimensions (in millimeters)

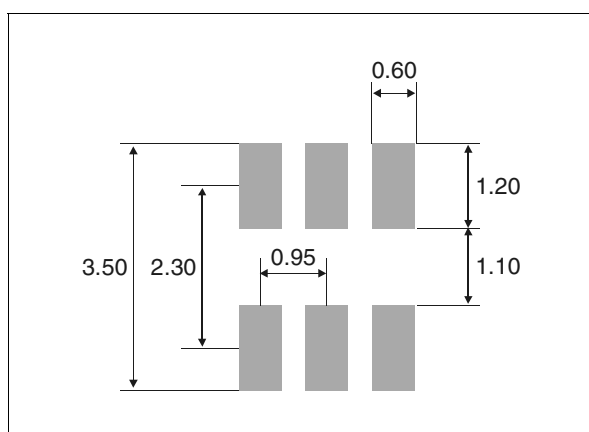


Table 4: Ordering Information

| Part Number | Marking | Package  | Weight  | Base qty | Delivery mode |
|-------------|---------|----------|---------|----------|---------------|
| ESDA6V1BC6  | BS55    | SOT23-6L | 16.7 mg | 3000     | Tape & reel   |

Table 5: Revision History

| Date       | Revision | Description of Changes                                                                                                       |
|------------|----------|------------------------------------------------------------------------------------------------------------------------------|
| Jan-2002   | 1A       | First issue.                                                                                                                 |
| 4-Nov-2004 | 2        | SOT23-6L package dimensions change for reference "D" from 3.0 millimeters (0.118 inches) to 3.05 millimeters (0.120 inches). |

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