

## 1. Description

The ESDA6V1-5SC6 is designed to protect voltage sensitive components from ESD and transient voltage events. Excellent clamping capability, low leakage, and fast response time, make these parts ideal for ESD protection on designs where board space is at a premium.

## 2. Features

- IEC 61000-4-2 Level 4 ESD Protection
  - $\pm 12\text{kV}$  Contact Discharge
  - $\pm 17\text{kV}$  Air Discharge
- 60W Peak pulse Power (8/20us)
- Low clamping voltage
- Working voltage: 5V
- Low leakage current
- RoHS compliant
- Protecting 4 unidirectional lines
- Ultra-low capacitance: 0.6pF Typ.

## 3. Applications

- USB 2.0
- Monitors and flat panel displays
- 10/100/1000 ethernet
- Notebook computers
- SIM ports
- ATM interface

## 4. Ordering Information

| Part Number  | Package   | Marking | Material     | Packing     | Quantity per reel | Flammability Rating | Reel Size |
|--------------|-----------|---------|--------------|-------------|-------------------|---------------------|-----------|
| ESDA6V1-5SC6 | SOT-23-6L | .V05    | Halogen free | Tape & Reel | 3,000 PCS         | UL 94V-0            | 7 inches  |

Table-1 Ordering information

## 5. Pin Configuration and Functions

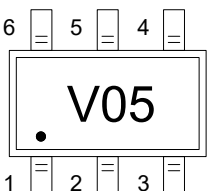
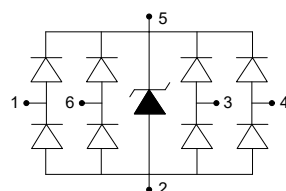
| Pin | Name | Description    | Outline                                                                           | Circuit Diagram                                                                     |
|-----|------|----------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | IO1  | Connect to I/O |  |  |
| 2   | GND  | Connect to GND |                                                                                   |                                                                                     |
| 3   | IO2  | Connect to I/O |                                                                                   |                                                                                     |
| 4   | IO3  | Connect to I/O |                                                                                   |                                                                                     |
| 5   | Vcc  | Connect to Vcc |                                                                                   |                                                                                     |
| 6   | IO4  | Connect to I/O |                                                                                   |                                                                                     |

Table-2 Pin configuration

## 6. Specification

### 6.1. Absolute Maximum rating

Over operating free-air temperature range (unless otherwise noted)

| Parameters                                 | Symbol           | Min. | Max. | Unit |
|--------------------------------------------|------------------|------|------|------|
| Peak pulse power (tp=8/20us)@25°C          | P <sub>pk</sub>  | -    | 60   | W    |
| Peak pulse current (tp=8/20us)@25°C        | I <sub>PP</sub>  |      | 4.5  | A    |
| ESD (IEC61000-4-2 air discharge) @25°C     | V <sub>ESD</sub> | -    | ±17  | kV   |
| ESD (IEC61000-4-2 contact discharge) @25°C | V <sub>ESD</sub> | -    | ±12  | kV   |
| Junction temperature                       | T <sub>J</sub>   | -    | 150  | °C   |
| Operating temperature                      | T <sub>OP</sub>  | -40  | 125  | °C   |
| Storage temperature                        | T <sub>STG</sub> | -55  | 150  | °C   |
| Lead temperature                           | T <sub>L</sub>   | -    | 260  | °C   |

Table-3 Absolute Maximum rating

## 6.2. Electrical Characteristics

At TA = 25°C unless otherwise noted

| Parameter                 | Symbol    | Conditions                       | Min. | Typ. | Max. | Units   |
|---------------------------|-----------|----------------------------------|------|------|------|---------|
| Reverse Stand-off Voltage | $V_{RWM}$ |                                  |      |      | 5.0  | V       |
| Reverse Breakdown Voltage | $V_{BR}$  | $I_T=1mA$                        | 6.0  |      |      | V       |
| Reverse Leakage Current   | $I_R$     | $V_{RWM}=5V$                     |      |      | 1.0  | $\mu A$ |
| Clamping Voltage          | $V_C$     | $I_{PP}=1A$ ; $t_p=8/20\mu s$    |      | 9.0  | 11.0 | V       |
| Clamping Voltage          | $V_C$     | $I_{PP}=4.5A$ ; $t_p=8/20\mu s$  |      | 12.0 | 15.0 | V       |
| Junction Capacitance      | $C_J$     | I/O to GND; $V_R=0V$ ; $f=1MHz$  |      | 0.6  | 1.0  | pF      |
|                           |           | Between I/O; $V_R=0V$ ; $f=1MHz$ |      | 0.3  | 0.5  | pF      |

Table-4 Electrical Characteristics

| Symbol    | Parameters                          |
|-----------|-------------------------------------|
| $V_{RWM}$ | Peak Reverse Working Voltage        |
| $I_R$     | Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$  | Breakdown Voltage @ $I_T$           |
| $I_T$     | Test Current                        |
| $I_{PP}$  | Maximum Reverse Peak Pulse Current  |
| $V_C$     | Clamping Voltage @ $I_{PP}$         |
| $I_F$     | Forward Current                     |
| $V_F$     | Forward Voltage @ $I_F$             |

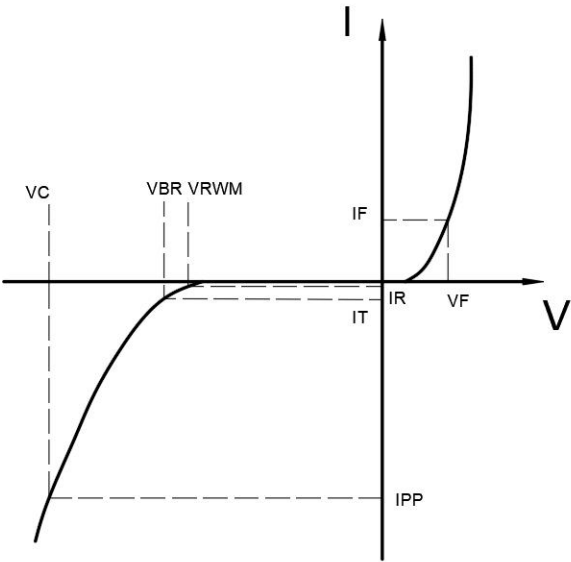


Figure1: Clamping Voltage vs. Peak Pulse Current

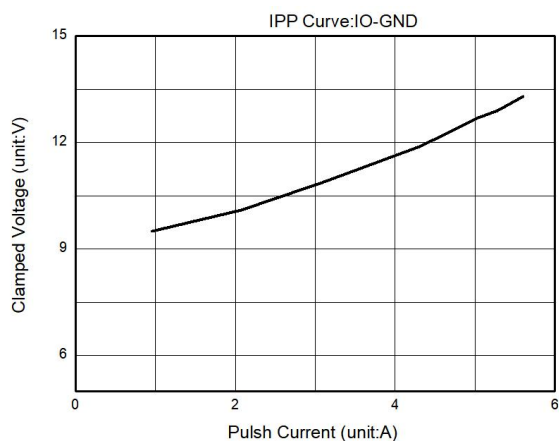


Figure2: 8 X 20us Pulse Waveform

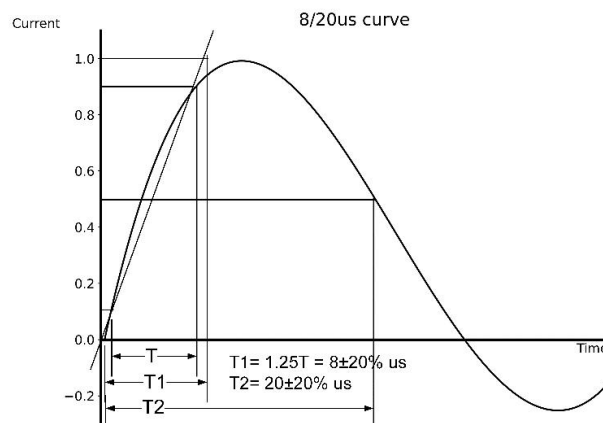


Figure3: Junction Capacitance vs. Reverse Voltage

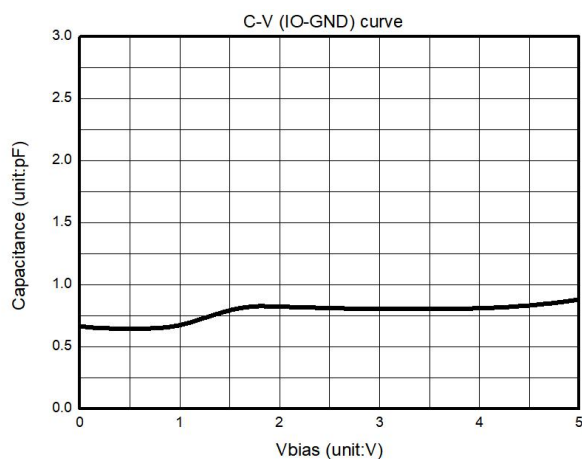


Figure4: Junction Capacitance vs. Reverse Voltage

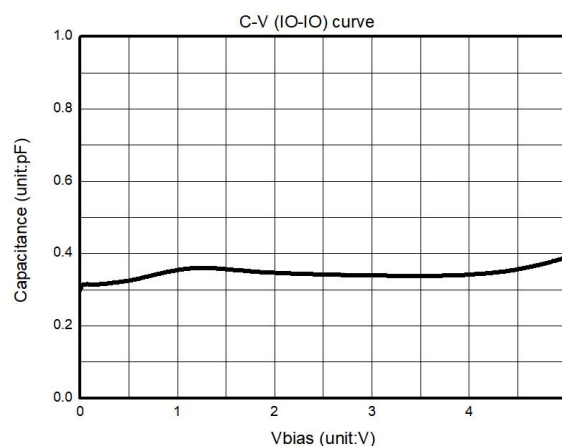
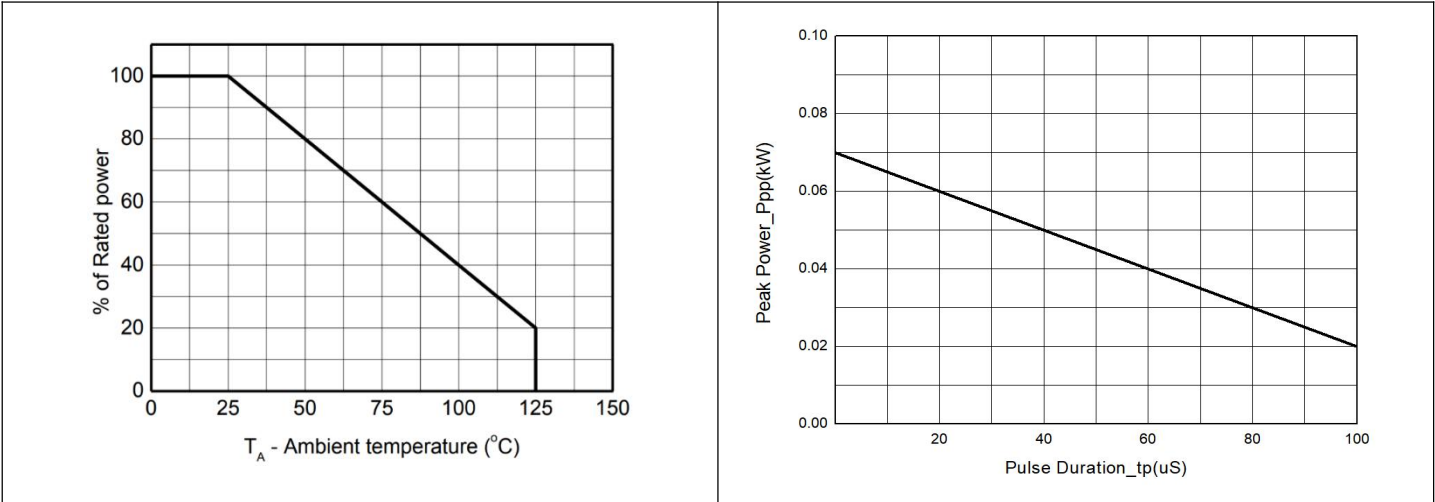


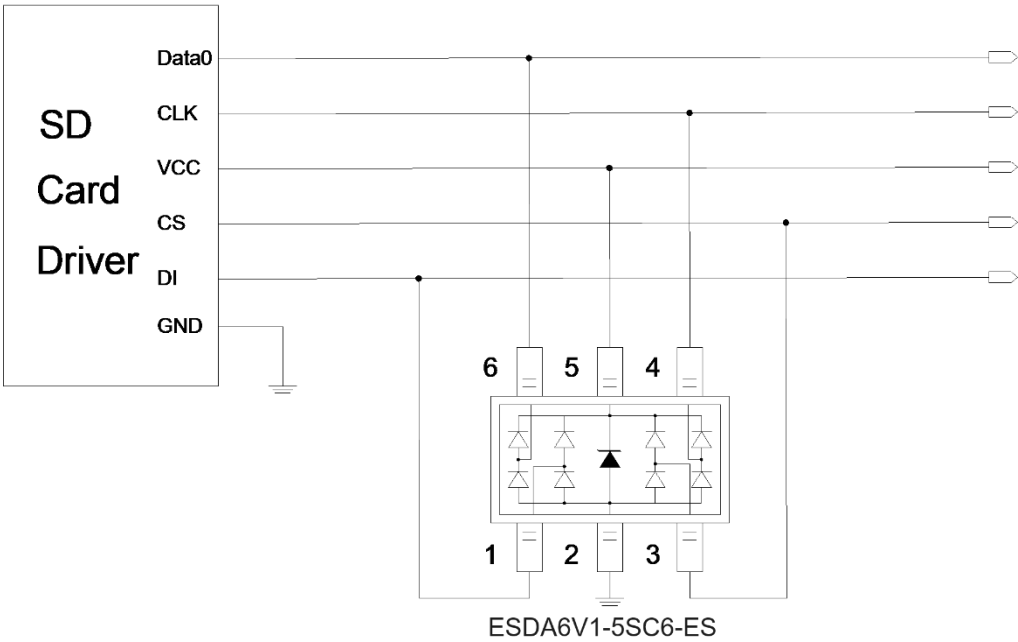
Figure5: Power derating vs. Ambient temperature

Figure6: Peak Pulse Power vs. Pulse Time



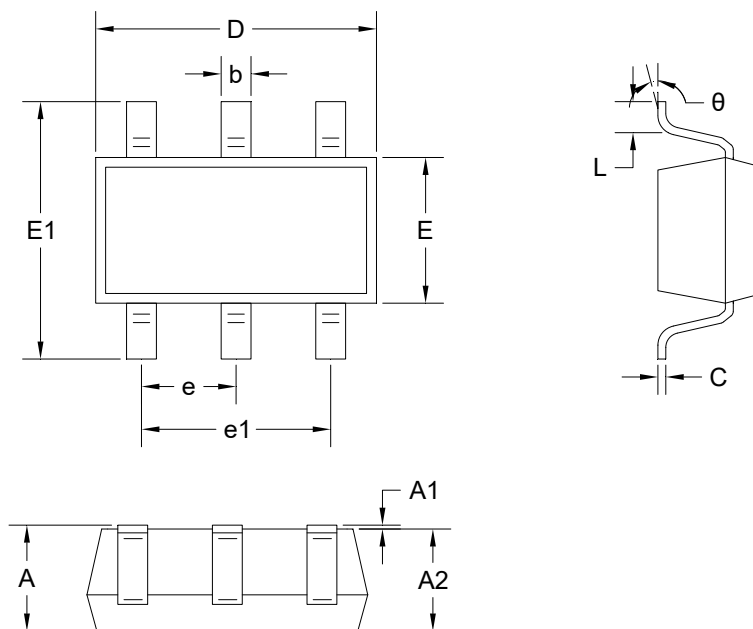
### 7. Typical Characteristic

### 8. Typical Application



Typical Interface Application

## 9. Dimension (SOT-23-6L)



Unit: mm

| Symbol |     | A     | A1    | A2       | b     | c     | D     |
|--------|-----|-------|-------|----------|-------|-------|-------|
| Spec   | Min | 1.050 | 0.000 | 1.050    | 0.300 | 0.100 | 2.820 |
|        | Max | 1.250 | 0.100 | 1.150    | 0.500 | 0.200 | 3.020 |
| Symbol |     | E     | E1    | e        | e1    | L     | θ     |
| Spec   | Min | 1.500 | 2.650 | 0.950BSC | 1.800 | 0.300 | 0°    |
|        | Max | 1.700 | 2.950 |          | 2.000 | 0.600 | 8°    |

Flow (wave) soldering (solder dipping)

| Product        | Peak Temperature | Dipping Time |
|----------------|------------------|--------------|
| Pb device      | 245°C±5°C        | 5sec±1sec    |
| Pb-Free device | 260°C+0/-5°C     | 5sec±1sec    |



This integrated circuit can be damaged by ESD. BYSEMI Corporation recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedure can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.