

Features

- Ultra low capacitance: 0.6pF typical
- Ultra low leakage: nA level
- Low operating voltage: 5V
- Low clamping voltage
- Protects one power line and four data lines
- Flow-through package
- Complies with following standards:
 - IEC 61000-4-2 (ESD) immunity test
Air discharge: ±15kV
Contact discharge: ±8kV
 - IEC61000-4-4 (EFT) 40A (5/50ns)
 - IEC61000-4-5 (Lightning) 5A (8/20µs)
- RoHS Compliant

Mechanical Characteristics

- Package: MSOP-10
- Lead Finish: Matte Tin
- Case Material: “Green” Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram

Applications

- DVI Ports
- HDMI Ports
- Set Top Box
- Projection TV
- Notebook Computers
- 10/100/1000 Ethernet
- Monitors and Flat Panel Displays

Part Number Code

| | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| E | S | D | 0 | 5 | 1 | 1 | L | 1 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

| Product Type | |
|--------------|---------------------------------------|
| ESD | TSK Electrostatic suppressor ESD Type |

| Reverse Working Voltage (V) | |
|-----------------------------|------|
| 3V3 | 3.3V |
| 05 | 5V |
| 16 | 16V |

| Line | |
|------|--------|
| 1 | 1-Line |
| 2 | 2-Line |
| 3 | 3-Line |

| Capacitance Type | |
|------------------|--------|
| L | Low |
| X | Normal |

| directional | |
|-------------|-----|
| 0 | Bi |
| 1 | Uni |

| Size | |
|------|---------|
| 1 | 0201 |
| 2 | 0402 |
| 3 | DFN0603 |
| 4 | DFN1006 |

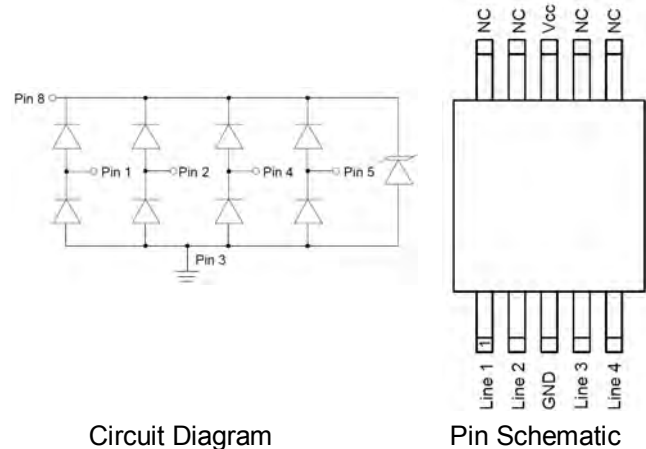
★ Code 4 to 9 is optional

Description

The ESD0541LS1 is an ultra low capacitance TVS array, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The ESD0541LS1 has an ultra-low capacitance with a typical value at 0.6pF, and complies with the IEC 61000-4-2 (ESD) standard with ±15kV air and ±8kV contact discharge. It is assembled into a 10-pin lead-free MSOP package. The flow through style package allows for easy PCB layout and matched trace lengths necessary to maintain consistent impedance between high speed differential lines. The small size, ultra-low capacitance and high ESD surge protection make ESD0541LS1 an ideal choice to protect high speed ports.



Dimensions and Pin Configuration



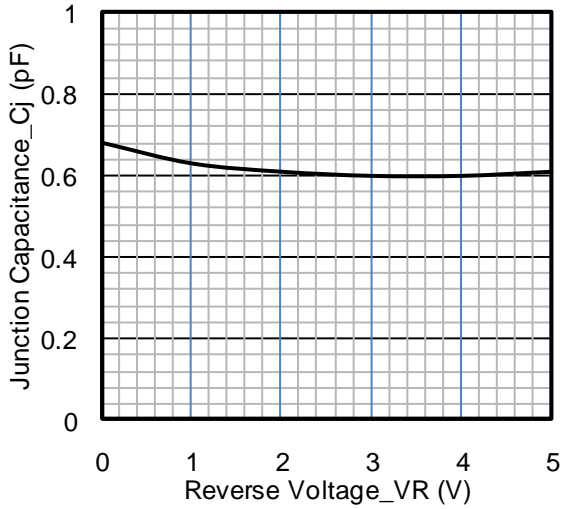
Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|--|------------------|-------------|--------------------|
| Peak Pulse Power (8/20 μs) | Ppk | 100 | W |
| Peak Pulse Current (8/20 μs) | I _{PP} | 5 | A |
| ESD per IEC 61000-4-2 (Air) | V _{ESD} | ± 15 | kV |
| ESD per IEC 61000-4-2 (Contact) | | ± 8 | |
| Operating Temperature Range | T _J | -55 to +125 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T _{stg} | -55 to +150 | $^{\circ}\text{C}$ |

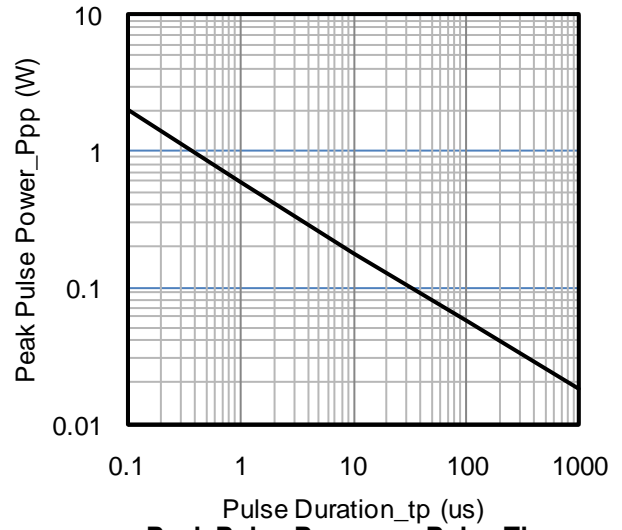
Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------|------------------|-----|-----|-----|---------------|--|
| Reverse Working Voltage | V _{RWM} | | | 5 | V | Any I/O pin to ground |
| Breakdown Voltage | V _{BR} | 6 | | | V | I _T = 1mA, any I/O pin to ground |
| Reverse Leakage Current | I _R | | | 0.5 | μA | V _{RWM} = 5V, any I/O pin to ground |
| Clamping Voltage | V _C | | | 12 | V | I _{PP} = 1A (8 x 20 μs pulse), any I/O pin to ground |
| Clamping Voltage | V _C | | | 20 | V | I _{PP} = 5A (8 x 20 μs pulse), any I/O pin to ground |
| Junction Capacitance | C _J | | 0.3 | 0.5 | pF | V _R = 0V, f = 1MHz, between I/O pins |
| Junction Capacitance | C _J | | 0.6 | 0.8 | pF | V _R = 0V, f = 1MHz, any I/O pin to ground |

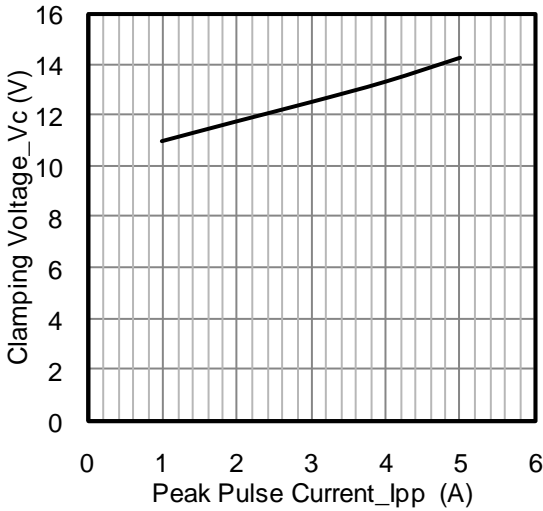
Typical Performance Characteristics (TA=25°C unless otherwise Specified)



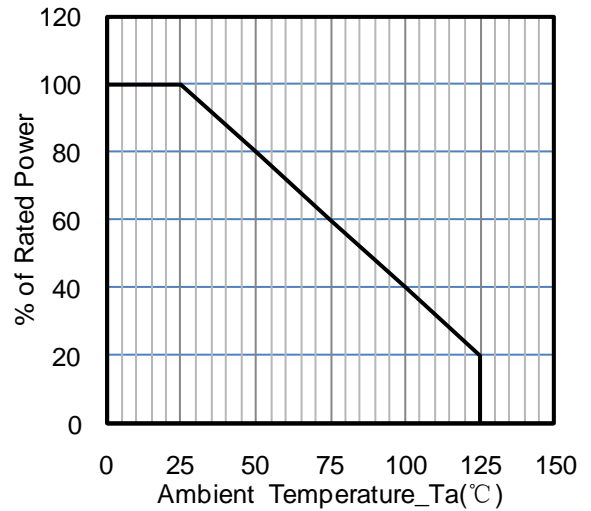
Junction Capacitance vs. Reverse Voltage



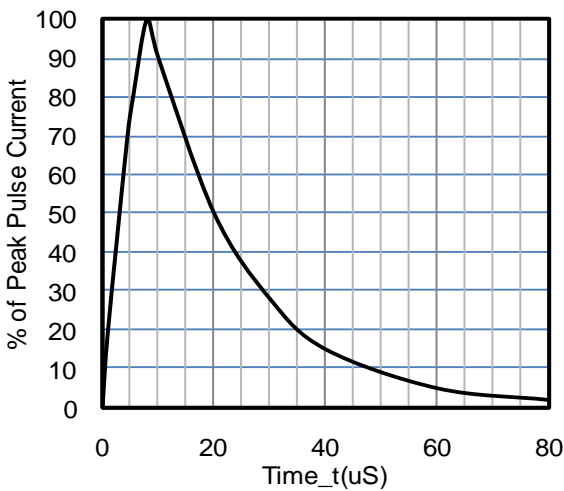
Peak Pulse Power vs. Pulse Time



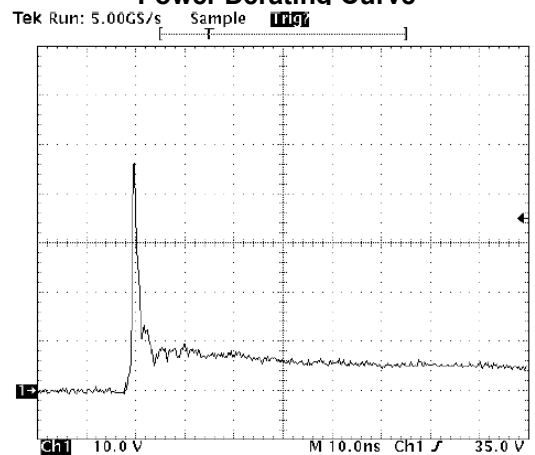
Clamping Voltage vs. Peak Pulse Current



Power Derating Curve



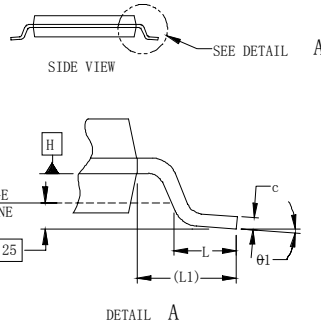
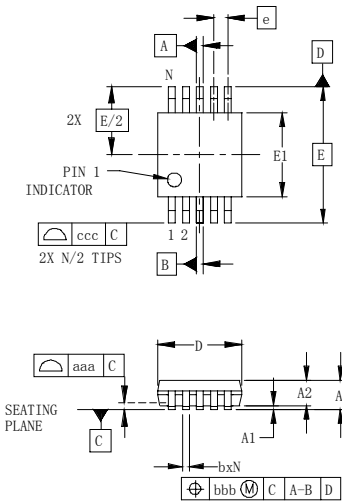
8 X 20uS Pulse Waveform



ESD Clamping Voltage

8 kV Contact per IEC61000-4-2

MSOP-10 Package Outline Drawing

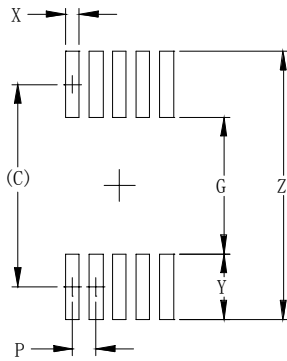


| DIM | INCHES | | MILLIMETERS | |
|--------|----------|---------|-------------|----------------|
| | MIN | NOM MAX | MIN | MMX |
| A | - | .043 | - | 1.10 |
| A1 | .000 | - | .006 | 0.15 |
| A2 | .030 | - | .037 | 0.95 |
| b | .007 | - | .011 | 0.27 |
| c | .003 | - | .009 | 0.23 |
| D | .114 | .118 | .122 | 2.90 3.00 3.10 |
| E1 | .114 | .118 | .122 | 2.90 3.00 3.10 |
| E | .193 BSC | | 4.90 BSC | |
| e | .020 BSC | | 0.50 BSC | |
| L | .016 | .024 | .032 | 0.40 0.60 0.80 |
| L1 | (.037) | | (.95) | |
| N | 10 | | 10 | |
| theta1 | 0° | - | 8° | 0° - 8° |
| aaa | .004 | | 0.10 | |
| bbb | .003 | | 0.08 | |
| ccc | .010 | | 0.25 | |

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. REFERENCE JEDEC STD M0-187, VARIATION BA.

Suggested Land Pattern



| DIM | DIMENSIONS | |
|-----|------------|-------------|
| | INCHES | MILLIMETERS |
| C | (.161) | (4.10) |
| G | .098 | 2.50 |
| P | .020 | 0.50 |
| X | .011 | 0.30 |
| Y | .063 | 1.60 |
| Z | .224 | 5.70 |

NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

Ordering Information

| Part Number | Packaging | Reel Size |
|-------------|------------------|-----------|
| ESD0541LS1 | 3000/Tape & Reel | 13 inch |