

Features

- Ultra low capacitance: 0.3pF typical (I/O to I/O)
- Ultra low leakage: nA level
- Low operating voltage: 5V
- Low clamping voltage
- Up to 4 data lines and one power line protects
- SC-70 6L package
- Complies with following standards:
 - IEC 61000-4-2 (ESD) immunity test
Air discharge: ±30kV
Contact discharge: ±25kV
 - IEC61000-4-4 (EFT) 40A (5/50ns)
 - IEC61000-4-5 (Lightning) 5A (8/20µs)
- RoHS Compliant

Mechanical Characteristics

- Package: SOT-363 (SC-70)
- 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

- USB 2.0 and USB 3.0 Ports
- USB OTG
- Digital Video Interface (DVI)
- Monitor and Flat Panel Displays
- PCI Express and Serial SATA Ports
- Gigabit Ethernet
- IEEE 1394 Firewire Ports
- Consumer products (STB, DVD, DSC, DVC...)

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 |

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

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

| | |
|------|---------|
| Size | |
| 1 | O201 |
| 2 | O402 |
| 3 | DFN0603 |
| 4 | DFN1006 |

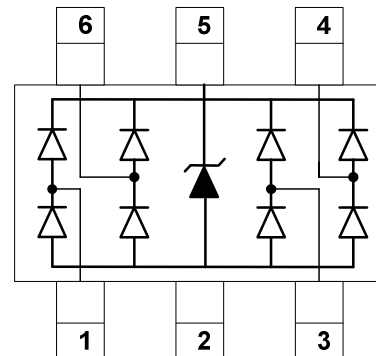
★ Code 4 to 9 is optional

Description

The ESD0541LL 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 ESD0541LL has an ultra-low capacitance with a typical value at 0.3pF, and complies with the IEC 61000-4-2 (ESD) standard with ±15kV air and ±8kV contact discharge. It is assembled into a 6-pin lead-free SC-70 package. The combination of small size, ultra low capacitance, and high ESD surge capability make it ideal for use in applications such as USB 3.0, multimedia, and other high speed ports.



Dimensions and Pin Configuration



Circuit and Pin Schematic

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

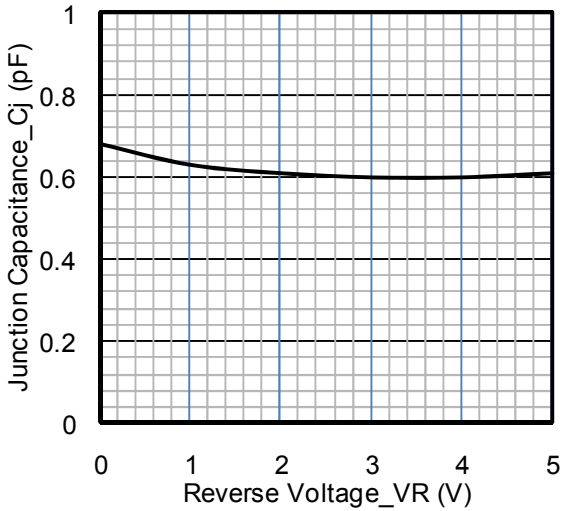
| Parameter | Symbol | Value | Unit |
|--|------------------|-------------|--------------------|
| Peak Pulse Power (8/20 μs) | Ppk | 100 | W |
| Peak Pulse Current (8/20 μs) | I _{PP} | 5 | A |
| ESD per IEC 61000-4-2 (Air) | V _{ESD} | ± 30 | kV |
| ESD per IEC 61000-4-2 (Contact) | | ± 25 | |
| Operating 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)

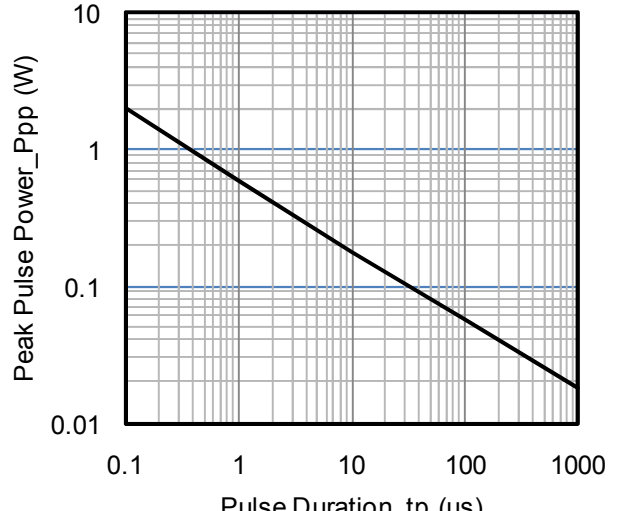
| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------|------------------|-----|-----|-----|---------------|--|
| Reverse Working Voltage | V _{RWM} | | | 5 | V | Any I/O pin to ground |
| Breakdown Voltage | V _{BR} | 6 | | | V | I _T = 1mA, any I/O pin to ground |
| Reverse Leakage Current | I _R | | | 0.5 | μA | V _{RWM} = 5V, any I/O pin to ground |
| Clamping Voltage | V _C | | | 15 | 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 | 0.4 | pF | V _R = 0V, f = 1MHz, between I/O pins |
| Junction Capacitance | C _J | | | 0.8 | pF | V _R = 0V, f = 1MHz, any I/O pin to ground |

Note 1: I/O pins are Pin 1, 3, 4 and 6

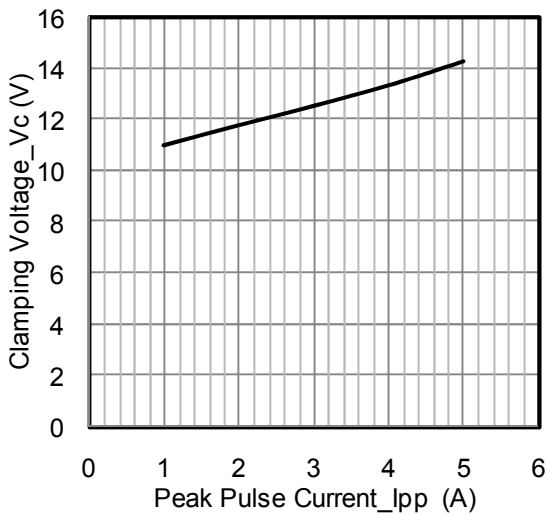
Typical Performance Characteristics (TA=25°C unless otherwise Specified)



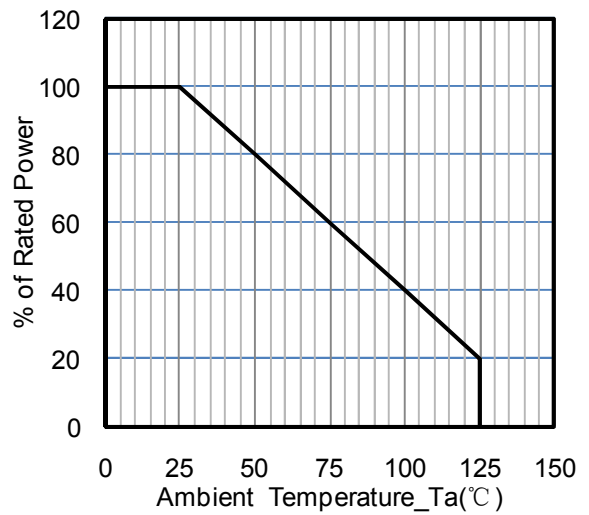
Junction Capacitance vs. Reverse Voltage



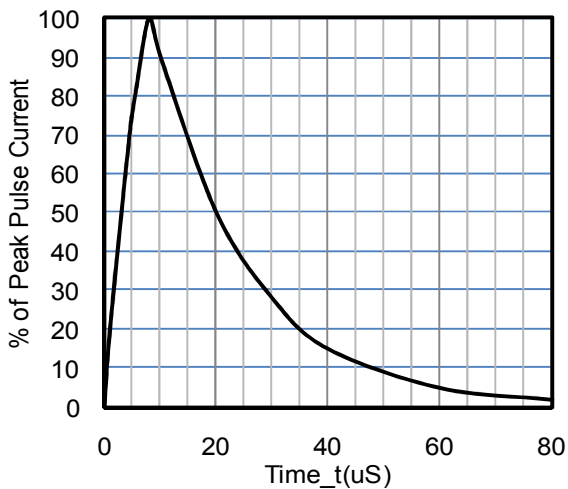
Peak Pulse Power vs. Pulse Time



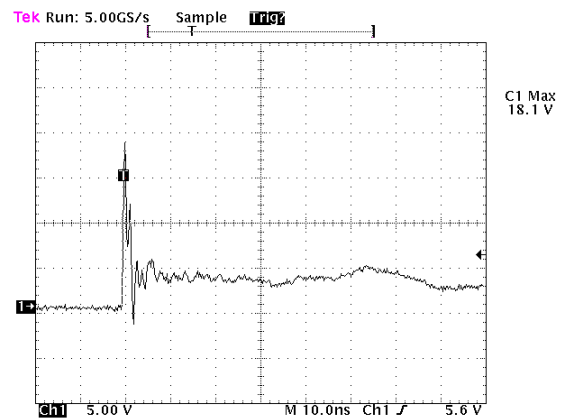
Clamping Voltage vs. Peak Pulse Current



Power Derating Curve



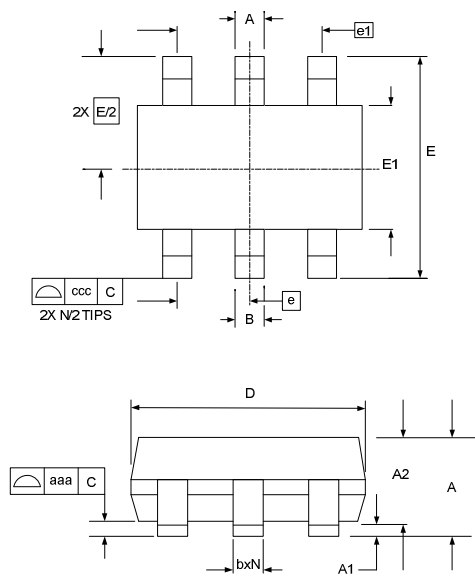
8 X 20uS Pulse Waveform



ESD Clamping Voltage

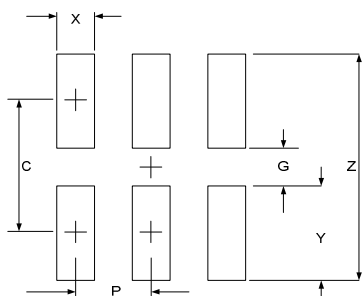
8 kV Contact per IEC61000-4-2

SOT-363 Package Outline Drawing



| SYM | DIMENSIONS | | | | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MILLIMETERS | | | INCHES | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | | | 1.10 | | | 0.043 |
| A1 | 0.00 | | 0.10 | 0.000 | | 0.004 |
| A2 | 0.70 | 0.90 | 1.00 | 0.028 | 0.035 | 0.039 |
| b | 0.15 | | 0.30 | 0.006 | | 0.012 |
| c | 0.08 | | 0.22 | 0.003 | | 0.009 |
| D | 1.80 | 2.00 | 2.20 | 0.071 | 0.079 | 0.087 |
| E1 | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| E | 2.10 BSC | | | 0.083 BSC | | |
| e | 0.65 BSC | | | 0.026 BSC | | |
| e1 | 1.30 BSC | | | 0.051 BSC | | |
| N | 6 | | | 6 | | |
| aaa | 0.10 | | | 0.004 | | |
| ccc | 0.30 | | | 0.012 | | |

Suggested Land Pattern



| SYM | DIMENSIONS | |
|-----|-------------|--------|
| | MILLIMETERS | INCHES |
| C | 1.85 | 0.073 |
| G | 1.00 | 0.039 |
| P | 0.65 | 0.026 |
| X | 0.40 | 0.016 |
| Y | 0.85 | 0.033 |
| Z | 2.70 | 0.106 |

Ordering Information

| art Number | ackaging | Reel Size |
|------------|------------------|-----------|
| ESD0541LL | 3000/Tape & Reel | 7 inch |