

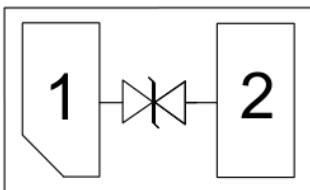
Features

- ◆ Ultra small package: 1.0x0.6x0.5mm
- ◆ Ultra low capacitance: 0.35pF typical
- ◆ Ultra low leakage: nA level
- ◆ Low operating voltage: 5V
- ◆ Low clamping voltage
- ◆ 2-pin leadless package
- ◆ Complies with following standards:
 - IEC 61000-4-2 (ESD) immunity test
 - Air discharge: $\pm 20\text{kV}$
 - Contact discharge: $\pm 15\text{kV}$
 - IEC61000-4-5 (Lightning) 4A (8/20 μs)
- ◆ RoHS Compliant

Description

The ESDA5B0M5D2 is a bi-directional TVS diode, 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 ESDA5B0M5D2 has an ultra-low capacitance with a typical value at 0.35pF, and complies with the IEC -4-2 (ESD) standard with $\pm 20\text{kV}$ air and $\pm 15\text{kV}$ contact discharge. It is assembled into an ultra-small 1.0x0.6x0.5mm lead-free DFN package. The small size, ultra-low capacitance and high ESD surge protection make ESDA5B0M5D2 an ideal choice to protect cell phone, digital video interfaces and other high speed ports.

Circuit Diagram



Applications

- ◆ Smart phones
- ◆ Display Ports
- ◆ MDDI Ports
- ◆ USB Ports
- ◆ Digital Video Interface (DVI)
- ◆ PCI Express and Serial SATA Ports

Absolute Maximum Ratings : ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

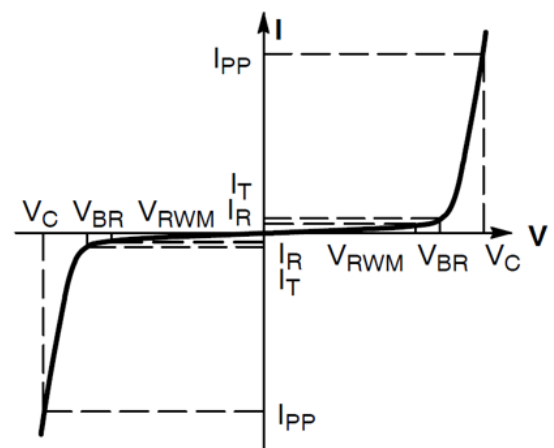
| Parameter | Symbol | Value | Unit |
|--|--------|-------------|--------------------|
| Peak Pulse Power (8/20 μs) | Ppk | 80 | W |
| Peak Pulse Current (8/20 μs) | IPP | 4 | A |
| ESD per IEC 61000-4-2 (Air) | VESD | ± 20 | kV |
| ESD per IEC 61000-4-2 (Contact) | | ± 15 | |
| Operating Temperature Range | TJ | -55 to +125 | $^{\circ}\text{C}$ |
| Storage Temperature Range | Tstg | -55 to +150 | $^{\circ}\text{C}$ |

Electrical Characteristics : ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|-------------------------|-----------|---|-----|------|------|---------------|
| Reverse Working Voltage | V_{RWM} | | | | 5.0 | V |
| Breakdown Voltage | V_{BR} | $I_T = 1\text{mA}$ | 6.0 | | 9.5 | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 5.0\text{V}$ | | | 0.1 | μA |
| Clamping Voltage | V_C | $I_{PP} = 1\text{A}$ (8 / 20 μs pulse) | | | 12.0 | V |
| Clamping Voltage | V_C | $I_{PP} = 4\text{A}$ (8 / 20 μs pulse) | | | 20.0 | V |
| Junction Capacitance | C_J | $V_R = 0\text{V}$, $f = 1\text{MHz}$ | | 0.35 | 0.5 | pF |

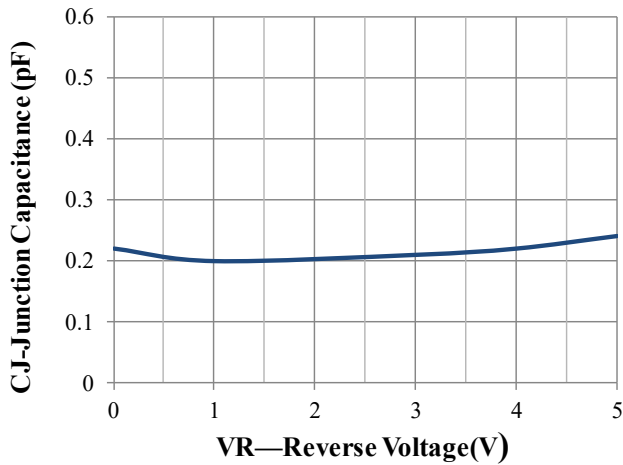
Portion Electronics Parameter

| Symbol | Parameter |
|-----------|-------------------------------------|
| 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} |

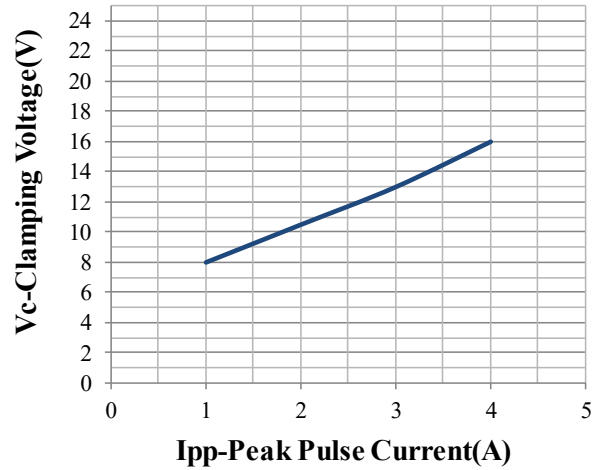


Bi-Directional TVS

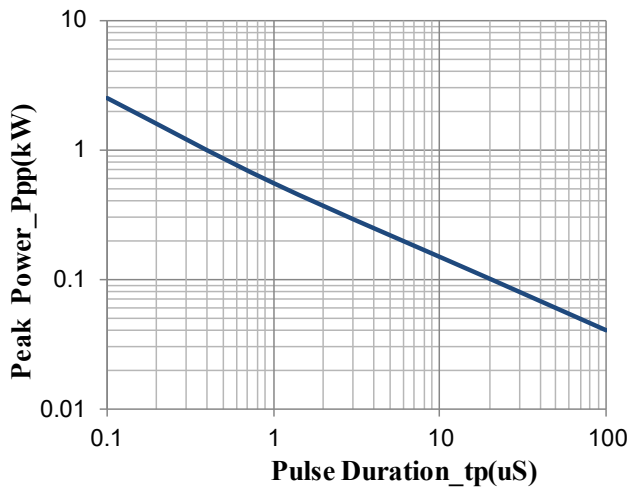
Typical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)



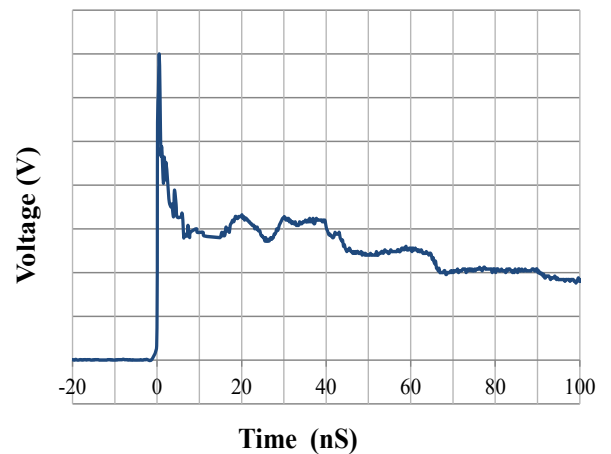
Junction Capacitance vs. Reverse Voltage



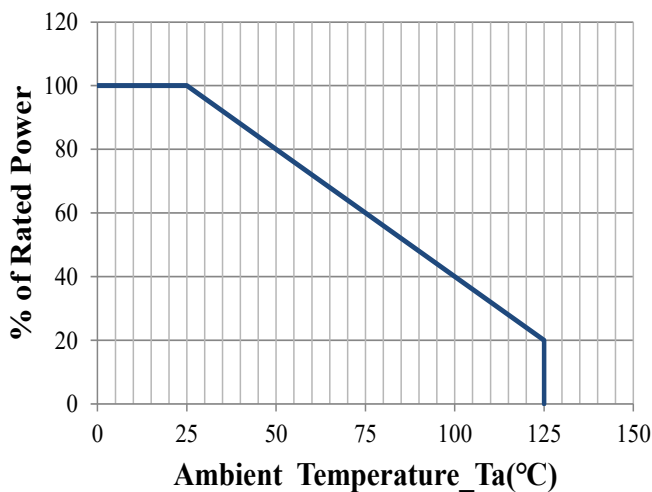
Clamping Voltage vs. Peak Pulse Current



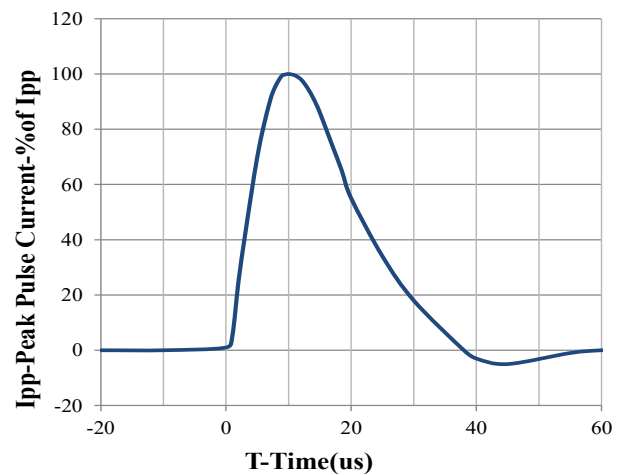
Peak Pulse Power vs. Pulse Time



IEC61000-4-2 Pulse Waveform



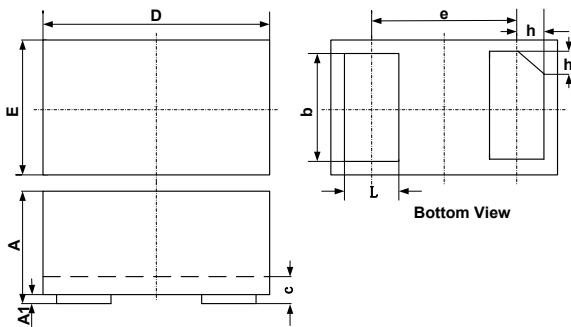
Power Derating Curve



8 X 20us Pulse Waveform

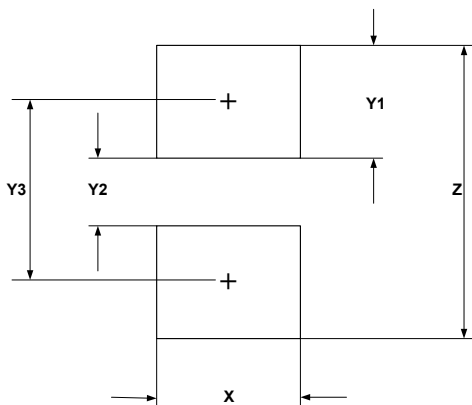
Package Dimension

DFN1006-2(0402) Package Outline



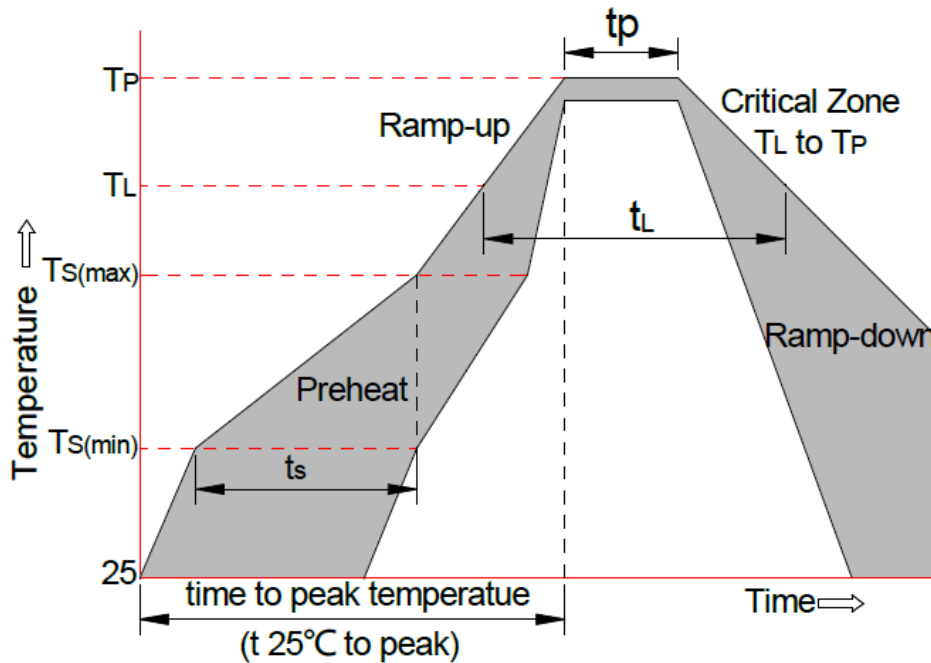
| SYM | DIMENSIONS | | | | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MILLIMETERS | | | INCHES | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| b | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |
| c | 0.12 | 0.15 | 0.18 | 0.005 | 0.006 | 0.007 |
| D | 0.95 | 1.00 | 1.05 | 0.037 | 0.039 | 0.041 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| E | 0.55 | 0.60 | 0.65 | 0.022 | 0.024 | 0.026 |
| L | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| h | 0.07 | 0.12 | 0.17 | 0.003 | 0.005 | 0.007 |

Suggested Land Pattern



| SYM | DIMENSIONS | |
|-----|-------------|--------|
| | MILLIMETERS | INCHES |
| X | 0.60 | 0.024 |
| Y1 | 0.50 | 0.020 |
| Y2 | 0.30 | 0.012 |
| Y3 | 0.80 | 0.032 |
| Z | 1.30 | 0.052 |

Soldering Parameters



| Reflow Condition | | Pb-Free Assembly |
|--|-------------------------------|------------------|
| Pre-heat | -Temperature Min (Ts (min)) | +150°C |
| | -Temperature Max (Ts (max)) | +200°C |
| | -Time (Min to Max) (ts) | 60-180 secs |
| Average ramp up rate(Liquid us Temp (TL) to peak) | | 3°C/sec. Max |
| Ts (max) to TL-Ramp-up Rate | | 3°C/sec. Max |
| Reflow | -Temperature (TL) (Liquid us) | +217°C |
| | -Temperature (tl) | 60-150 secs |
| Peak Temp (Tp) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp (tp) | | 30 secs. Max |
| Ramp-down Rate | | 6 °C/secs. Max |
| xTime 25°C to Peak Temp (Tp) | | 8 min. Max |
| Do not exceed | | +260°C |