

## *Bidirectional Single Line TVS Protection Diode*

### *UM5060 SOD523*

#### **General Description**

The UM5060 TVS protection diode is designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and PDA's. They feature large cross-sectional area junctions for conducting high transient currents, offer desirable electrical characteristics for board level protection, such as fast response time, lower operating voltage, lower clamping voltage and no device degradation when compared to MLVs. The UM5060 TVS protection diode protects sensitive semiconductor components from damage or upset due to electrostatic discharge (ESD) and other voltage induced transient events. The UM5060 is available in SOD523 package with working voltages of 5 volt. It gives designer the flexibility to protect bidirectional single line in applications where arrays are not practical. Additionally, it may be "sprinkled" around the board in applications where board space is at a premium. It may be used to meet the ESD immunity requirements of IEC 61000-4-2,  $\pm 30\text{kV}$  air,  $\pm 30\text{kV}$  contact discharge.

#### **Applications**

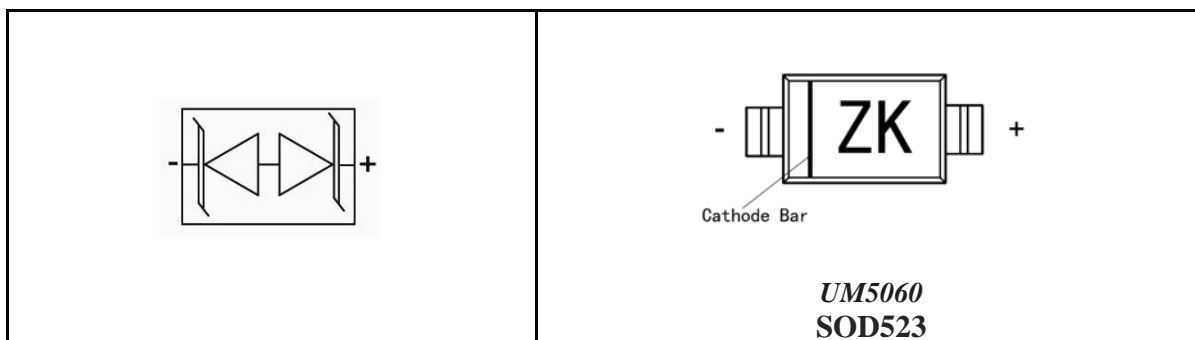
Cell Phone Handsets and Accessories  
 Personal Digital Assistants (PDA's)  
 Notebooks, Desktops and Servers  
 Portable Instrumentation  
 Cordless Phones  
 Smart Card  
 Digital Cameras  
 MP3 Players

#### **Features**

Transient protection for data lines to  
 IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (air),  $\pm 30\text{kV}$  (contact)  
 Small package for use in portable electronics  
 Suitable replacement for MLV's in ESD protection applications  
 Bidirectional TVS protection  
 Stand off voltages: 5V  
 Low leakage current  
 Low diode capacitance

#### **Pin Configurations**

#### **Top View**



## Ordering Information

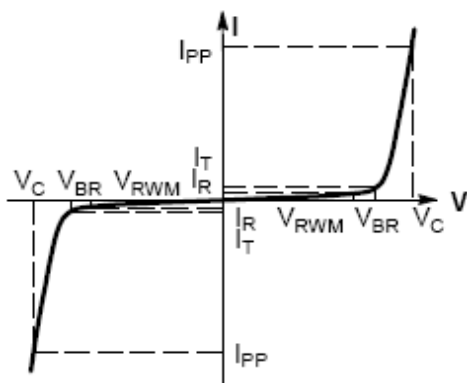
| Part Number | Working Voltage | Packaging Type | Channel | Marking Code | Shipping Qty            |
|-------------|-----------------|----------------|---------|--------------|-------------------------|
| UM5060      | 5.0V            | SOD523         | 1       | ZK           | 3000/7 Inch Tape & Reel |

## Absolute Maximum Ratings

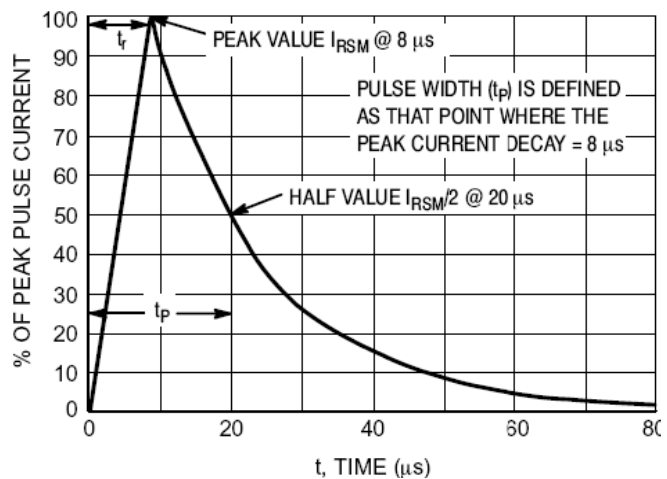
| RATING   | SYMBOL    | VALUE         | UNITS       |
|--|-----------|---------------|-------------|
| Peak Pulse Power ( $t_p = 8/20\mu s$ )         | $P_{PK}$  | 140           | Watts       |
| Maximum Peak Pulse Current ( $t = 8/20\mu s$ ) | $I_{PP}$  | 11            | Amps        |
| Lead Soldering Temperature                     | $T_L$     | 260 (10 sec.) | $^{\circ}C$ |
| Operating Temperature                          | $T_J$     | -55 to +125   | $^{\circ}C$ |
| Storage Temperature                            | $T_{STG}$ | -55 to +150   | $^{\circ}C$ |

## Symbol Definition

| PARAMETER                                   | SYMBOL    |
|---|-----------|
| Maximum Reverse Peak Pulse Current          | $I_{PP}$  |
| Clamping Voltage @ $I_{PP}$                 | $V_C$     |
| Working Peak Reverse Voltage                | $V_{RWM}$ |
| Maximum Reverse Leakage Current @ $V_{RWM}$ | $I_R$     |
| Breakdown Voltage @ $I_T$                   | $V_{BR}$  |
| Test Current                                | $I_T$     |
| Peak Power Dissipation                      | $P_{PK}$  |
| Max. Capacitance @ $V_R = 0V, f = 1MHz$     | $C_J$     |



Bi-Directional TVS

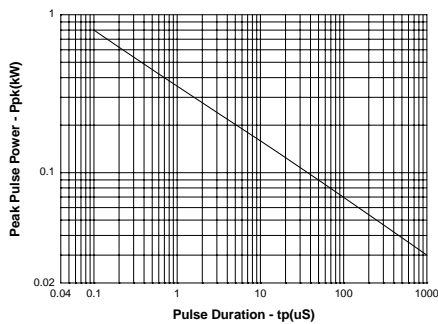


## Electrical Characteristics (T=25°C, Device for 5.0V Reverse Stand-off Voltage)

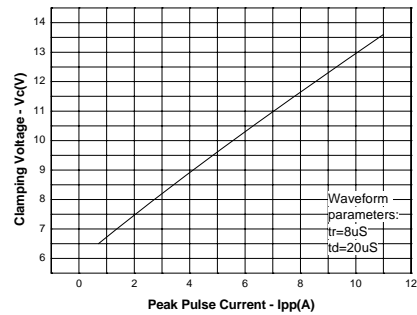
| PARAMETER                 | SYMBOL    | CONDITIONS                                   | MIN | TYP | MAX  | UNIT          |
|---------------------------|-----------|--|-----|-----|------|---------------|
| Reverse Stand-Off Voltage | $V_{RWM}$ |  |     |     | 5    | V             |
| Reverse Breakdown Voltage | $V_{BR}$  | $I_T = 1\text{mA}$                           | 6.5 |     | 8.5  | V             |
| Reverse Leakage Current   | $I_R$     | $V_{RWM} = 5\text{V}, T=25^\circ\text{C}$    |     |     | 1    | $\mu\text{A}$ |
| Clamping Voltage          | $V_C$     | $I_{PP} = 5\text{A}, t_p = 8/20\mu\text{S}$  |     |     | 9.7  | V             |
|                           |           | $I_{PP} = 11\text{A}, t_p = 8/20\mu\text{S}$ |     |     | 13.6 |               |
| Junction Capacitance      | $C_J$     | $V_R = 0\text{V}, f = 1\text{MHz}$           |     | 40  | 55   | pF            |
| Junction Capacitance      | $C_J$     | $V_R = 2.5\text{V}, f = 1\text{MHz}$         |     | 30  | 40   | pF            |

## Typical Operating Characteristics

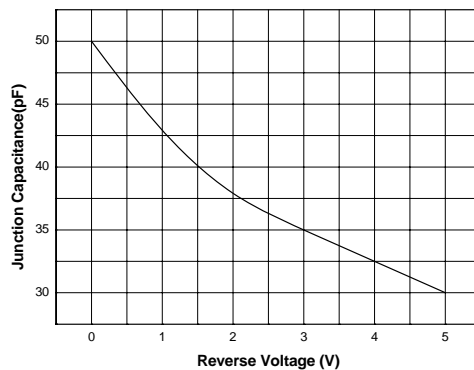
### Non-Repetitive Peak Pulse Power vs. Pulse Time



### Clamping Voltage vs. Peak Pulse Current



### Junction Capacitance vs. Reverse Voltage



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## Applications Information

### Device Connection Options

UM5060 ESD protection diode is designed to protect one bidirectional data, I/O or power supply line from the damage caused by ESD and surge pulses. The device is bidirectional and may be used on lines where the signal polarity is above ground and below ground.

### Circuit Board Layout Recommendations for Suppression of ESD

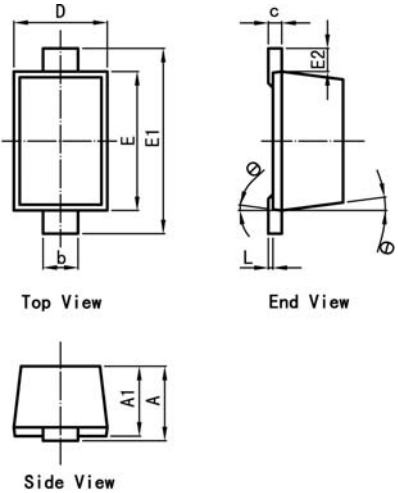
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

1. Place the TVS near the input terminals or connectors to restrict transient coupling.
2. Minimize the path length between the TVS and the protected line.
3. Minimize all conductive loops including power and ground loops.
4. The ESD transient return path to ground should be kept as short as possible.
5. Never run critical signals near board edges.
6. Use ground planes whenever possible. For multilayer printed-circuit boards, use ground vias.
7. Keep parallel signal paths to a minimum.
8. Avoid running protection conductors in parallel with unprotected conductor.
9. Avoid using shared transient return paths to a common ground point.

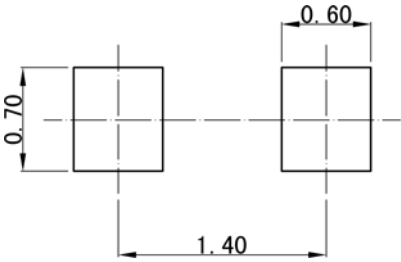
## Package Information

### UM5060 SOD523

#### Outline Drawing

|   |             |       |          |       |
|---|-------------|-------|----------|-------|
|  | millimeters |       | Inches   |       |
|   | Symbol      | Min   | Max      | Min   |
| A   | 0.510       | 0.770 | 0.020    | 0.031 |
| A1  | 0.500       | 0.700 | 0.020    | 0.028 |
| b   | 0.250       | 0.350 | 0.010    | 0.014 |
| c   | 0.080       | 0.150 | 0.003    | 0.006 |
| D   | 0.750       | 0.850 | 0.030    | 0.033 |
| E   | 1.100       | 1.300 | 0.043    | 0.051 |
| E1  | 1.500       | 1.700 | 0.059    | 0.067 |
| E2  | 0.200REF    |       | 0.008REF |       |
| L   | 0.010       | 0.070 | 0.001    | 0.003 |
| $\theta$  | 7° REF      |       | 7° REF   |       |

#### Land Pattern

|   |   |
|---|---|
|  | <p>NOTES:</p> <ol style="list-style-type: none"> <li>Compound dimension: 1.20×0.80 ;</li> <li>Unit: mm;</li> <li>General tolerance ±0.05 mm unless otherwise specified;</li> <li>The layout is just for reference.</li> </ol> |
|---|---|

#### Tape and Reel Orientation



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