

# WS05MS

## Transient Voltage Suppressor

### Features

- Solid-state silicon-avalanche technology
- 350 Watts Peak Pulse Power per Line ( $t_p=8/20\mu s$ )
- Low operating and clamping voltages
- Up to Four (4) Lines of Protection
- Working Voltage: 5 V
- Low Leakage

### IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD)  $\pm 15kV$  (air),  $\pm 8kV$  (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 24A (8/20 $\mu s$ )

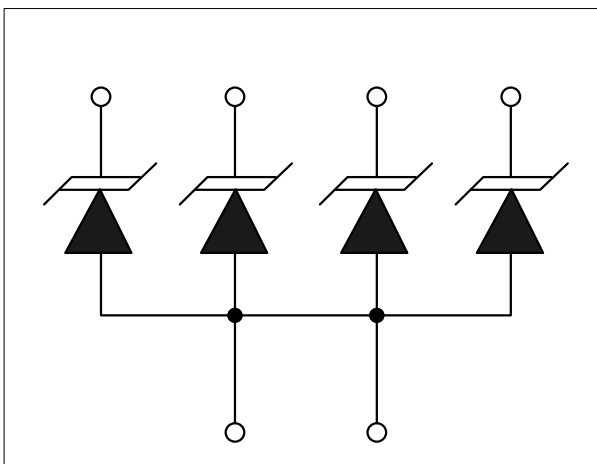
### Mechanical Characteristics

- SOT-23-6L package
- Molding compound flammability rating: UL 94V-0
- Marking: Marking Code
- Packaging: Tape and Reel
- RoHS/WEEE Compliant

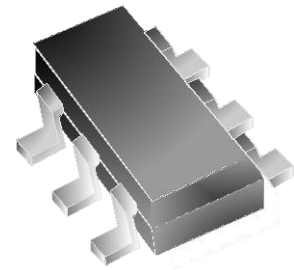
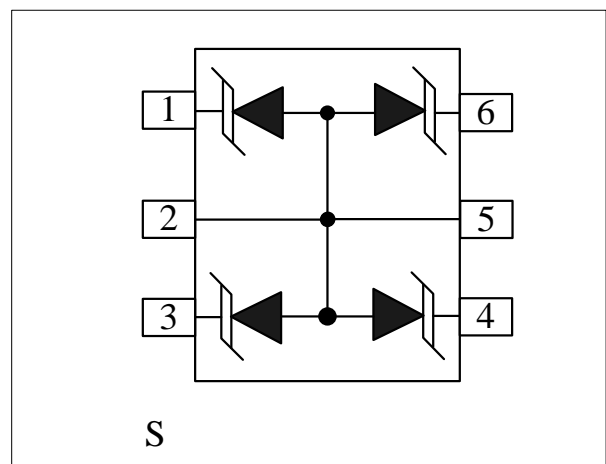
### Applications

- Cell phone Handsets & Accessories
- Personal Digital Assistants (PDAs)
- Notebook, Laptop, and Palmtop Computers
- Portable Instrumentation
- Digital Cameras
- MP3 Player

### Circuit Diagram



### Schematic & PIN Configuration

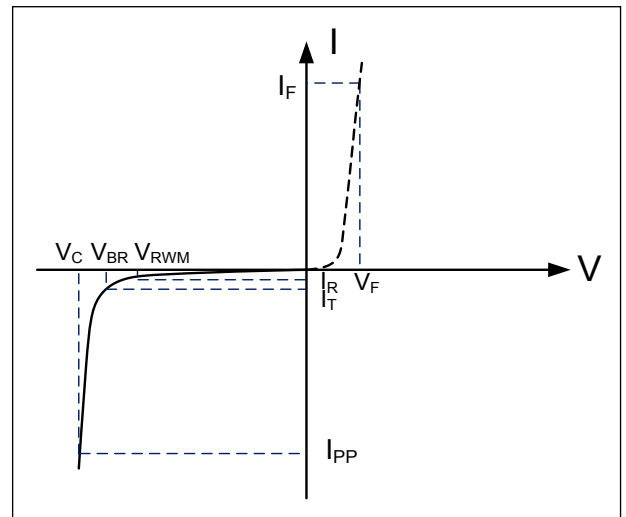


**SOT-23-6L**

Absolute Maximum Rating			
Rating	Symbol	Value	Units
Peak Pulse Power ( $t_p = 8/20\mu s$ )	$P_{PP}$	350	Watts
Peak Forward Voltage ( $I_F = 1A$ , $t_p = 8/20\mu s$ )	$V_{FP}$	1.35	V
Operating Temperature	$T_J$	-55 to + 125	°C
Storage Temperature	$T_{STG}$	-55 to +150	°C

## Electrical Parameters (T=25°C)

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

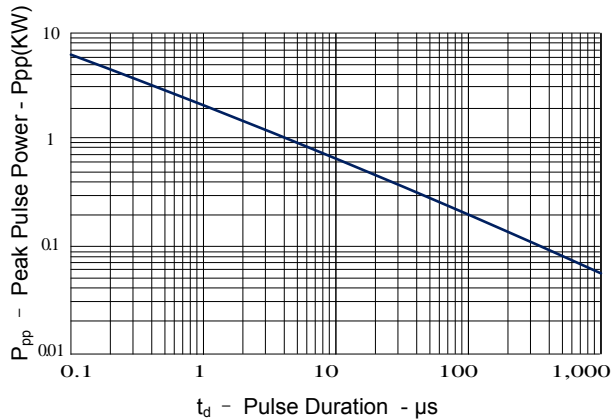


## Electrical Characteristics

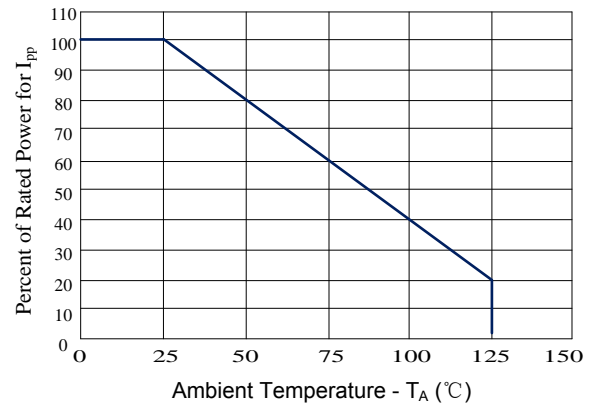
WS05MS						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	$V_{RWM}$				5.0	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T = 1mA$	6.0			V
Reverse Leakage Current	$I_R$	$V_{RWM} = 5V$ , $T = 25^\circ C$			1	$\mu A$
Peak Pulse Current	$I_{PP}$	$t_p = 8/20\mu s$			24	A
Clamping Voltage	$V_C$	$I_{PP} = 5A$ , $t_p = 8/20\mu s$			9.5	V
Clamping Voltage	$V_C$	$I_{PP} = 24A$ , $t_p = 8/20\mu s$		13.5	15	V
Junction Capacitance	$C_j$	Between I/O pins and Ground $V_R = 0V$ , $f = 1MHz$		150		pF

## Typical Characteristics

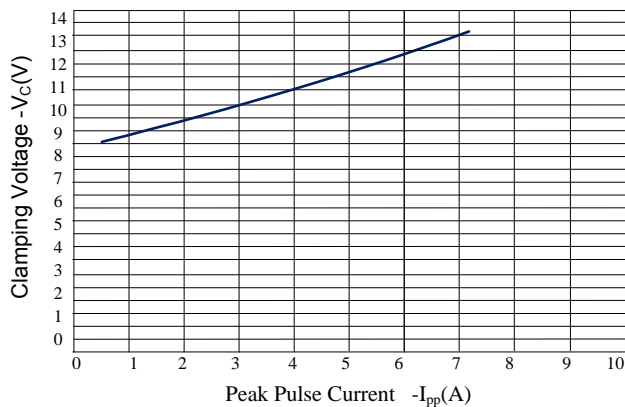
**Figure 1: Peak Pulse Power vs. Pulse Time**



**Figure 2: Power Derating Curve**



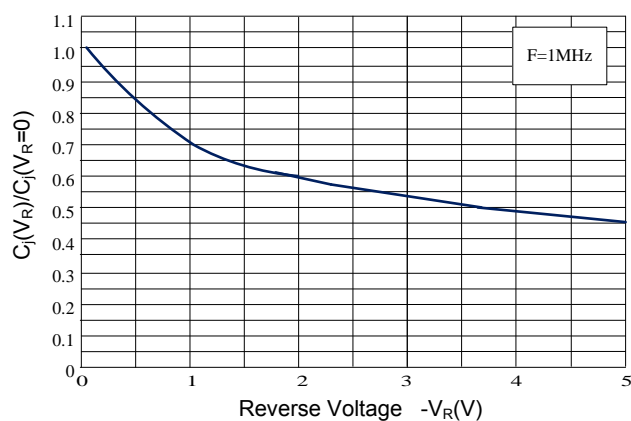
**Figure 3: Clamping Voltage vs. Peak Pulse Current**



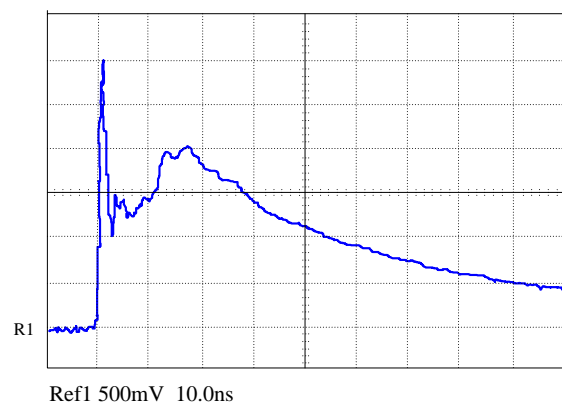
**Figure 4: WE05MF Insertion Loss**



**Figure 5: Normalized Junction Capacitance vs. Reverse Voltage**



**Figure 6: ESD Pulse Waveform (Per IEC 61000-4-2)**



## Application Information

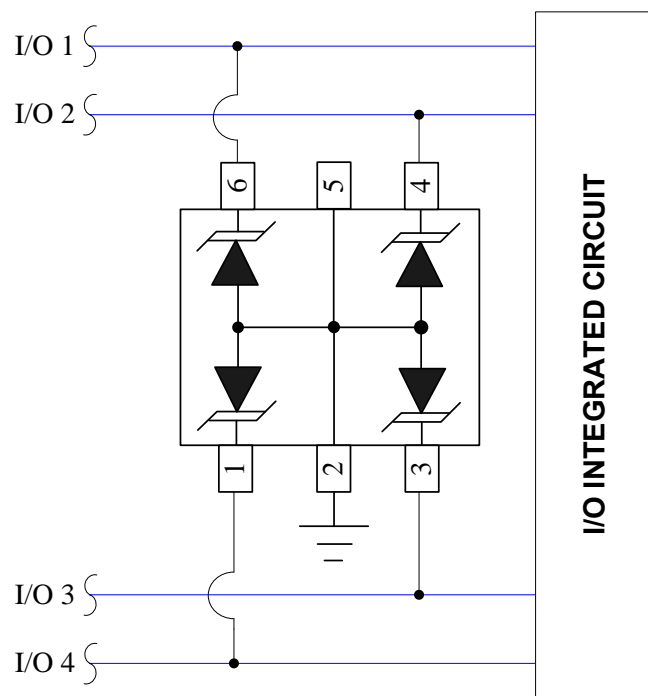
The WSxxMS Series are TVS arrays designed to protect I/O or data lines from the damaging effects of ESD or EFT. This product provides unidirectional protection; the device is connected as follows:

### UNIDIRECTIONAL COMMON-MODE CONFIGURATION

The WSxxMS Series provides up to four (4) lines of protection in a common-mode configuration as depicted in Figure 7.

Circuit connectivity is as follows:

- I/O 1 is connected to Pin 1.
- I/O 2 is connected to Pin 3.
- I/O 3 is connected to Pin 4.
- I/O 4 is connected to Pin 6.
- Pin 2 is connected to ground.
- Pin 5 is not connected



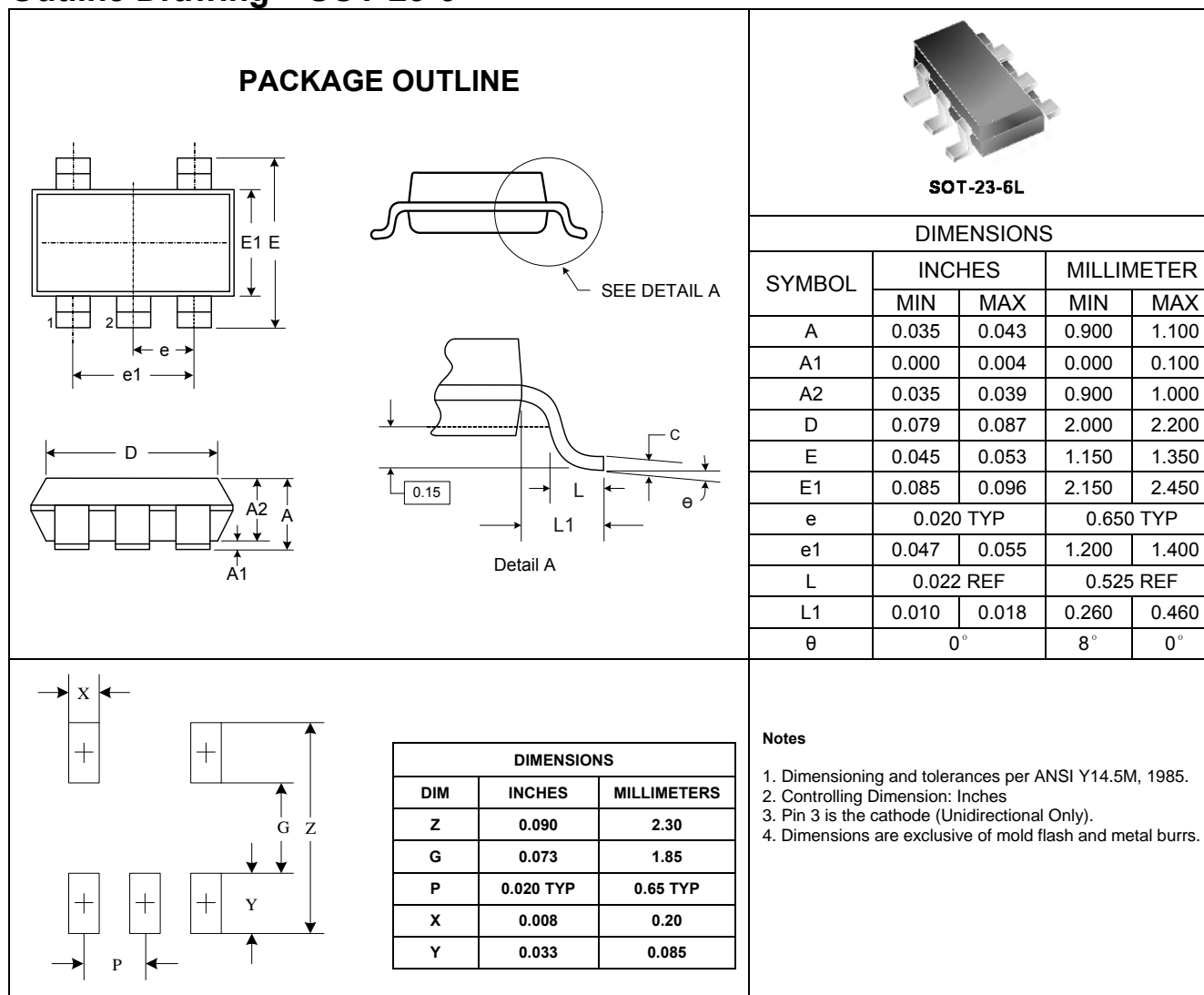
**Figure 7 Unidirectional Configuration Common-Mode I/O Port Protections**

### CIRCUIT BOARD LAYOUT RECOMMENDATIONS

Circuit board layout is critical for Electromagnetic Compatibility (EMC) protection. The following guidelines are recommended:

- The protection device should be placed near the input terminals or connectors, the device will divert the transient current immediately before it can be coupled into the nearby traces.
- The path length between the TVS device and the protected line should be minimized.
- All conductive loops including power and ground loops should be minimized.
- The transient current return path to ground should be kept as short as possible to reduce parasitic inductance.
- Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

## Outline Drawing – SOT-23-6



## Marking Codes

Part Number	WS05MS
Marking Code	05S