

### General Description

The AOZ8S401US4-05 is a 4-channel transient voltage suppressor array designed to protect high speed data lines such as USB2.0 in notebook and computer from damaging ESD events.

This device incorporates eight surge rated, low capacitance steering diodes and a TVS in a single package. During transient conditions, the steering diodes direct the transient to either the positive side of the power supply line or to ground.

The AOZ8S401US4-05 comes in a RoHS compliant and Halogen Free SOT23-6L package and is rated for -40°C to +125°C junction temperature range.

### Features

- ESD protection for high-speed data lines:
  - IEC 61000-4-2, level 4 (ESD) immunity test
    - Air discharge: ±30kV
    - Contact discharge: ±30kV
  - IEC61000-4-4 (EFT, 5/50ns): 40A
  - IEC61000-4-5 (Lightning) 9A (8/20µs)
  - Human Body Model (HBM) ±8kV
- Protects four I/O lines
- Low capacitance between I/O to GND: 1.2 pF
- Low clamping voltage
- Low operating voltage: 5.0 V

### Applications

- USB2.0
- SD and SIM cards
- Monitors and flat panel displays
- Set-top box
- Notebook computers



### Typical Application

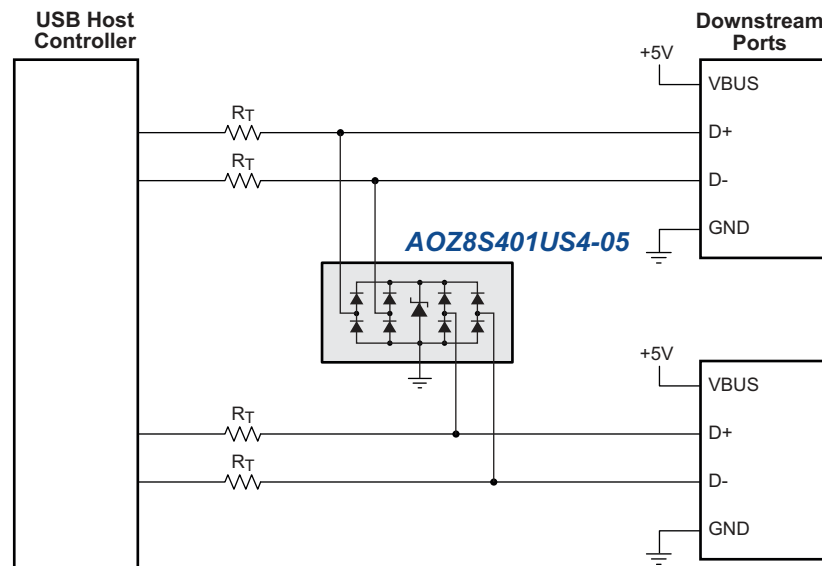


Figure 1. USB High Speed Ports

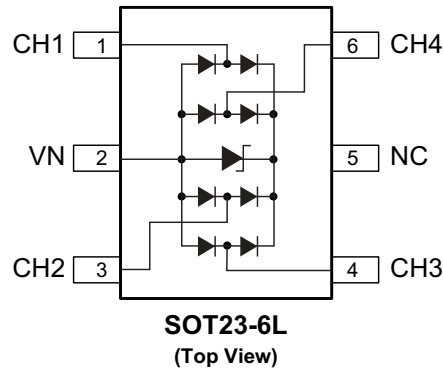
## Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ8S401US4-05	-40°C to +125°C	SOT23-6L	Green Product



AOS Green Products use reduced levels of Halogens, and are also RoHS compliant.  
Please visit [www.aosmd.com/media/AOSGreenPolicy.pdf](http://www.aosmd.com/media/AOSGreenPolicy.pdf) for additional information.

## Pin Configuration



## Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

Parameter	Rating
Storage Temperature ( $T_S$ )	-65°C to +150°C
ESD Rating per IEC61000-4-2, contact <sup>(1)</sup>	±30kV
ESD Rating per IEC61000-4-2, air <sup>(1)</sup>	±30kV
8/20µs Surge IEC61000-4-5	±9 A
ESD Rating per Human Body Model <sup>(2)</sup>	±8kV

### Notes:

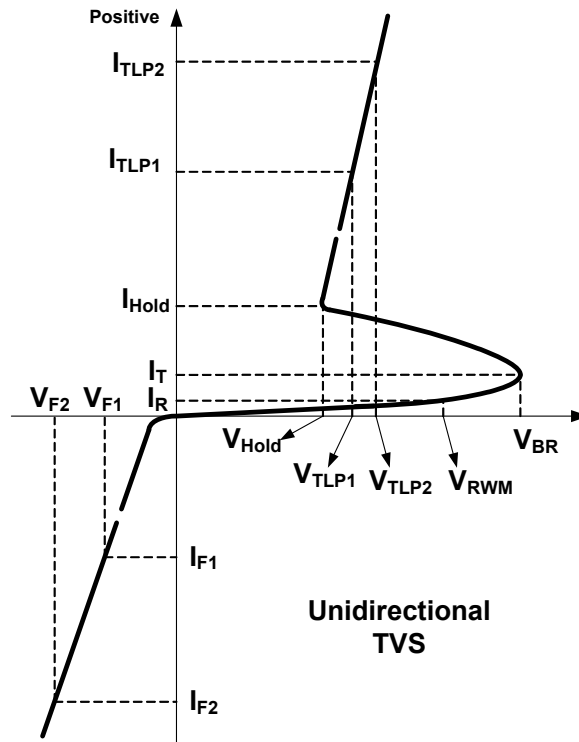
- IEC 61000-4-2 discharge with  $C_{Discharge} = 150\text{pF}$ ,  $R_{Discharge} = 330\Omega$ .
- Human Body Discharge per MIL-STD-883, Method 3015  $C_{Discharge} = 100\text{pF}$ ,  $R_{Discharge} = 1.5\text{k}\Omega$ .

## Maximum Operating Ratings

Parameter	Rating
Junction Temperature ( $T_J$ )	-40°C to +125°C

### Electrical Characteristics

T<sub>A</sub> = 25°C unless otherwise specified. Any I/O Pin to GND.



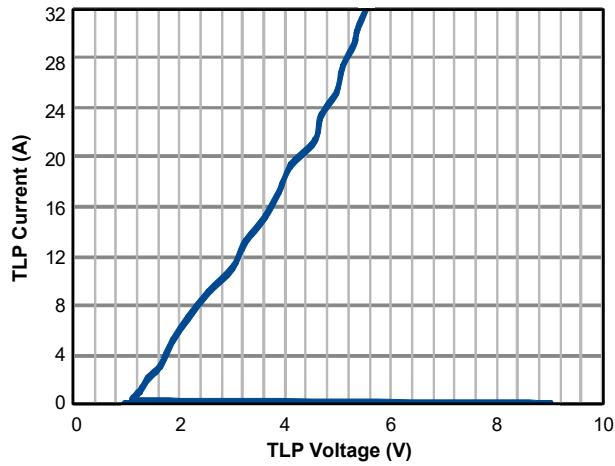
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$V_{RWM}$	Reverse Working Voltage				5	V
$V_{BR}$	Reverse Breakdown Voltage	$I_T = 100\mu A$	6	8.5	11	V
$I_R$	Reverse Leakage Current	$V_T = Max, V_{RWM}$		1	50	nA
$V_F$	Diode Forward Voltage	$I_F = 15mA$		0.85		V
$V_{CL}$	Clamping Voltage <sup>(3)(4)</sup> (100ns Transmission Line Pulse)	$I_{PP} = 1A$ $I_{PP} = -1A$		1.5 -1	2.5 -2	V
		$I_{PP} = 16A$ $I_{PP} = -16A$		4 -4	5 -5	
$R_{DYN}$	Dynamic Resistance	$I_{TLP} = 8A \text{ to } 16A$ $I_{TLP} = -8A \text{ to } -16A$		0.16 0.16		$\Omega$
$V_{CL}$	Clamping Voltage <sup>(3)</sup> IEC61000-4-5 Surge 8/20 $\mu s$	$I_{PP} = 1A$ $I_{PP} = -1A$		1.5 -1.5	2.0 -2.0	V
		$I_{PP} = 10A$ $I_{PP} = -10A$		4.5 -4.5	6 -6	
$C_j$	Junction Capacitance	$V_{I/O} = 0V, f = 1MHz, \text{ Any I/O pin to Ground}$		1.2	1.8	pF

**Notes:**

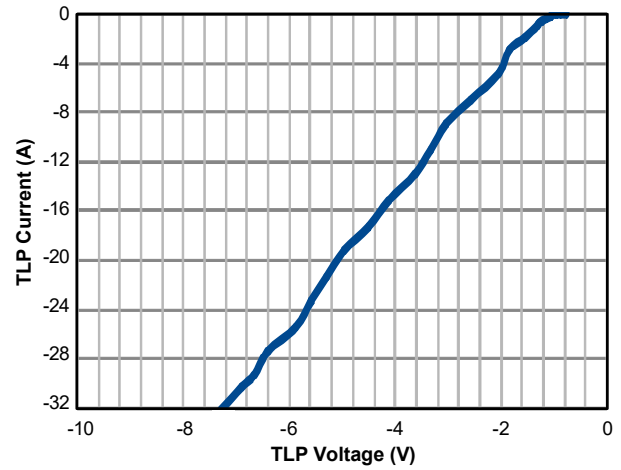
- 3. These specifications are guaranteed by design and characterization.
- 4. Measurements performed using a 100ns Transmission Line Pulse (TLP) system.

## Typical Performance Characteristics

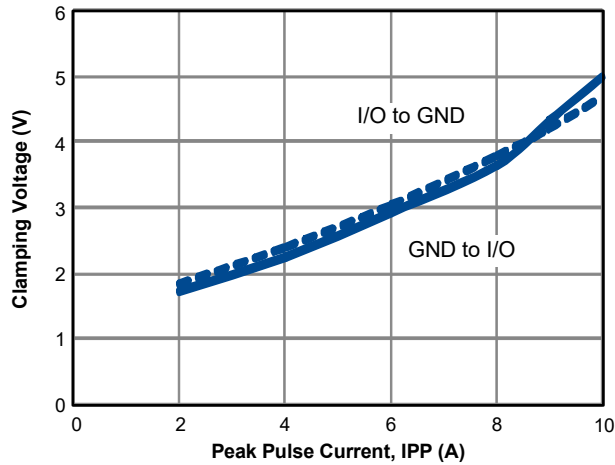
**Positive Transmission Line Pulse**  
( $t_p=100\text{ns}$ ,  $t_r=0.2\text{ns}$ )



**Negative Transmission Line Pulse**  
( $t_p=100\text{ns}$ ,  $t_r=0.2\text{ns}$ )



**IEC61000-4-5 Surge 8.20 $\mu$ s**



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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.