

### General Description

SY205229AWC is a low-capacitance transient voltage suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With a typical capacitance of 1.2pF, SY205229AWC is designed to protect against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD) ( $\pm 30\text{kV}$  air,  $\pm 30\text{kV}$  contact discharge), IEC 61000-4-5 (surge) (7.5A, 8/20 $\mu\text{s}$ ).

The combined features of low capacitance, small size and high ESD robustness make SY205229AWC ideal for high-speed data ports and high-frequency lines (e.g., VGA) applications. The low clamping voltage of the SY205229AWC guarantees minimum stress on the protected IC.

Each SY205229AWC device can protect two high-speed data lines. The SY205229AWC is available in a compact SOT-143 package.

### Features

- Transient protection for High-Speed data lines
  - IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (Air)  $\pm 30\text{kV}$  (Contact)
  - IEC 61000-4-5 (Surge) 7.5A (8/20 $\mu\text{s}$ )
- Small package (2.9mm  $\times$  2.4mm  $\times$  1.0mm)
- Protects two data lines
- Low capacitance: 1.2pF Typical (I/O-GND)
- Low leakage current: 0.01 $\mu\text{A}$  @  $V_{\text{RWM}}$  (Typical)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for  $\pm 8\text{kV}$  contact discharge.

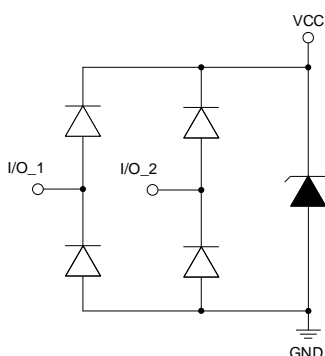
### Applications

- Desktops, Servers, and Notebooks
- USB2.0 Power and Data Line Protection
- IEEE 1394 Firewire Ports
- Video Graphics Cards
- SIM Ports

### Mechanical Characteristics

- SOT-143 Package
- Marking: Device Code, Date Code
- Packaging: Tape and Reel

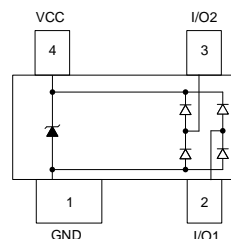
### Circuit Diagram



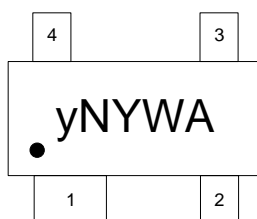
## Ordering Information

Part Number	Package Type	Top Mark
SY205229AWC	SOT-143 RoHS Compliant and Halogen Free	yNYWA

## Pinout (Top View)



## Marking Codes



**Note 1:** “yN” is device code, fixed.

**Note 2:** “YWA” is date code.

Absolute Maximum Rating				
Parameter	Symbol	Min	Max	Unit
Maximum Peak Pulse Current (8/20μs)	$I_{PP}$		7.5	A
Maximum Peak Pulse Power (8/20μs)	$P_{PK}$		100	W
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$V_{ESD}$	-30	30	kV
Operating Temperature	$T_{OPT}$	-40	+125	°C
Storage Temperature	$T_{STG}$	-55	+150	°C

Electrical Characteristics ( $T_A = 25^\circ\text{C}$ )						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Nominal Reverse Working Voltage	$V_{RWM}$				5.0	V
Reverse Leakage Current @ $V_{RWM}$	$I_R$	$V_{RWM} = 5\text{V}$ , $T_A = 25^\circ\text{C}$ From I/O to GND		0.01	0.1	μA
Reverse Breakdown Voltage @ $I_T$	$V_{BR}$	$I_T = 1\text{mA}$ From I/O to GND	6.0	8.0	10.0	V
Forward Voltage @ $I_F$	$V_F$	$I_F = 1\text{mA}$ From GND to I/O	0.4	0.7	1.2	V
Clamping Voltage @ $I_{PP}$	$V_C(1)$	$I_{PP} = 7.5\text{A}$ , $t_p = 8/20\mu\text{s}$ From I/O to GND		12.5	13.5	V
Clamping Voltage @ $I_{PP}$	$V_C(1)$	$I_{PP} = 16\text{A}$ , $t_p = 10/100\text{ns}$ From I/O to GND		12		V
Dynamic Resistance	$R_{DYN}(1) (2)$	$t_p = 10/100\text{ns}$ From I/O to GND		0.25		Ω
Parasitic Capacitance	$C_{ESD}(1)$	$V_R = 2.5\text{V}$ , $f = 1\text{MHz}$ From I/O to GND		1.20	1.50	pF
Parasitic Capacitance	$C_{ESD}(1)$	$V_R = 2.5\text{V}$ , $f = 1\text{MHz}$ Between I/O and I/O		0.60	0.75	pF

**Note 1:** Guaranteed by design and not subject to production test.

**Note 2:**  $R_{DYN}$  calculated based on  $I_{PP}=8\text{A}$  to  $I_{PP}=16\text{A}$ ,  $t_p = 10/100\text{ns}$ .

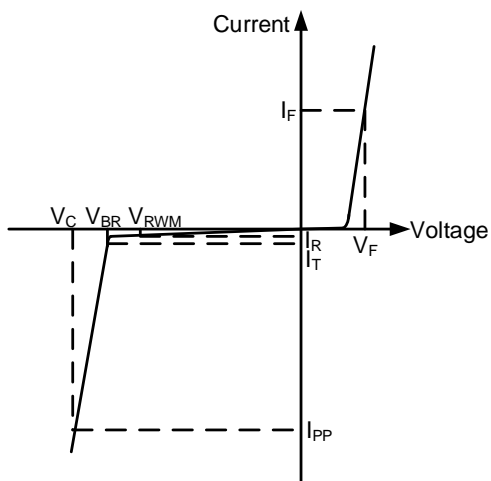


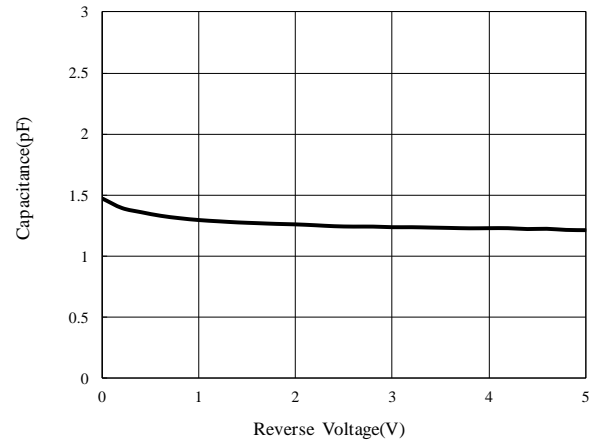
Figure 1. Uni-directional TVS

## Typical Characteristics

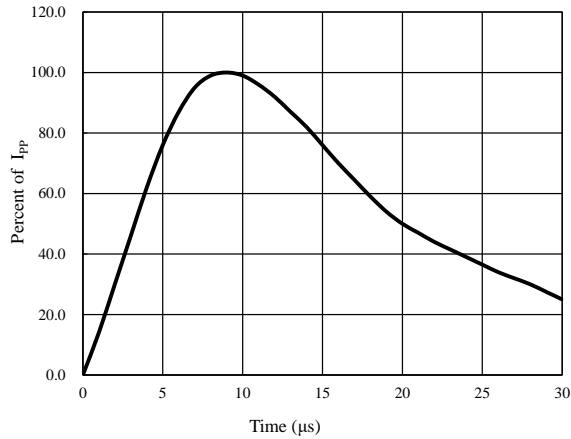
### TLP Sweeping of I/O to GND



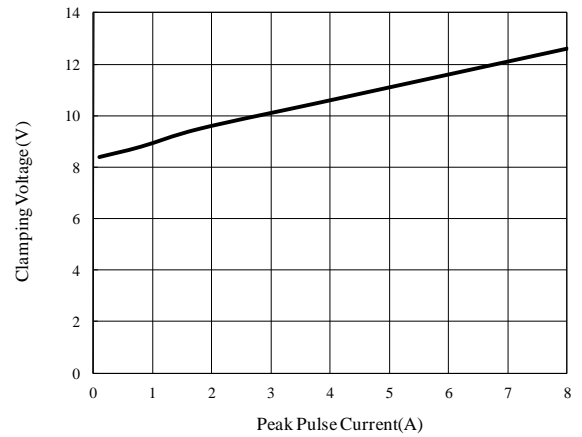
### Capacitance vs. Voltage



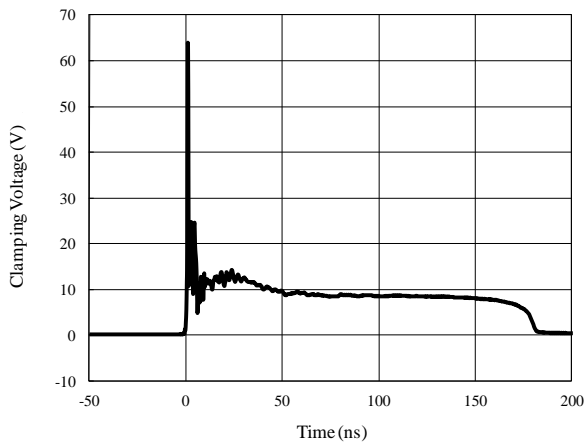
### Pulse Waveform



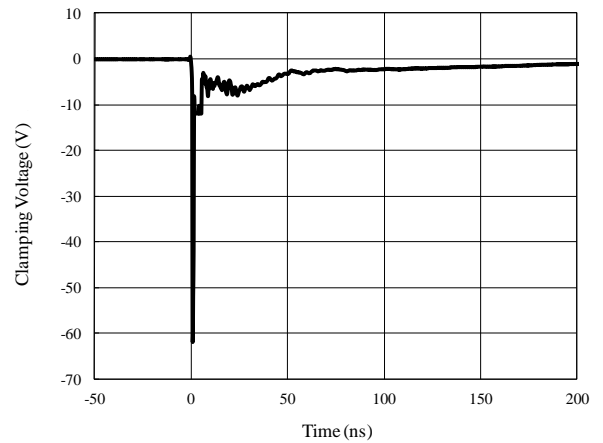
### Clamping Voltage vs. Peak Pulse Current



### ESD Clamping of I/O\_1 to I/O\_2 (+8kV Contact per IEC 61000-4-2)



### ESD Clamping of I/O\_1 to I/O\_2 (-8kV Contact per IEC 61000-4-2)

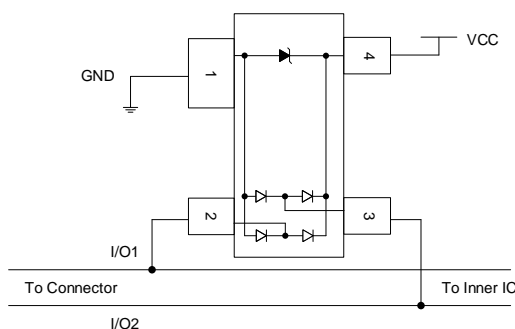


## Application Information

### Pin Connections

SY205229AWC is designed to provide ESD protection for two data lines simultaneously. The pin connections are shown in Figure 2.

You can connect two parallel data lines from the protected IC to the I/O port connector and through the two SY205229AWC I/O pins. Pin1 of SY205229AWC is the negative reference pin, which should connect to the ground. The connection wires should be as short as possible to minimize the parasitic inductance.

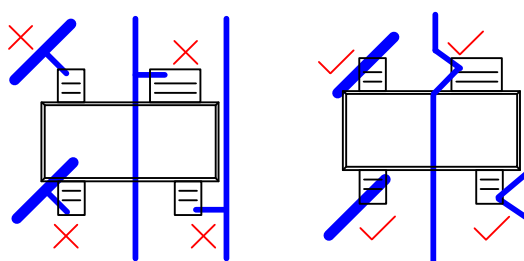


**Figure 2. SY205229AWC Pin Connections in PCB**

### PCB Layout Guidelines

For optimum ESD protection and circuit performance, the following PCB layout guidelines are recommended:

- Place SY205229AWC as close to the connector port as possible.
- The distance between the SY205229AWC ground pin and the GND reference path should be as short as possible.
- Use large vias to connect the SY205229AWC VCC and GND pins to the PCB VCC and GND.
- Avoid running critical signals near board edges.

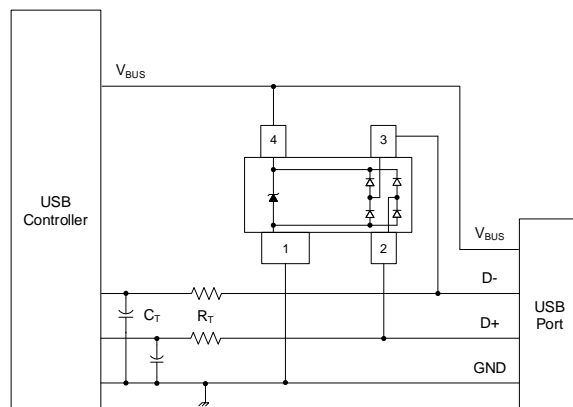


**Figure 2. SY205229AWC Layout Guideline**

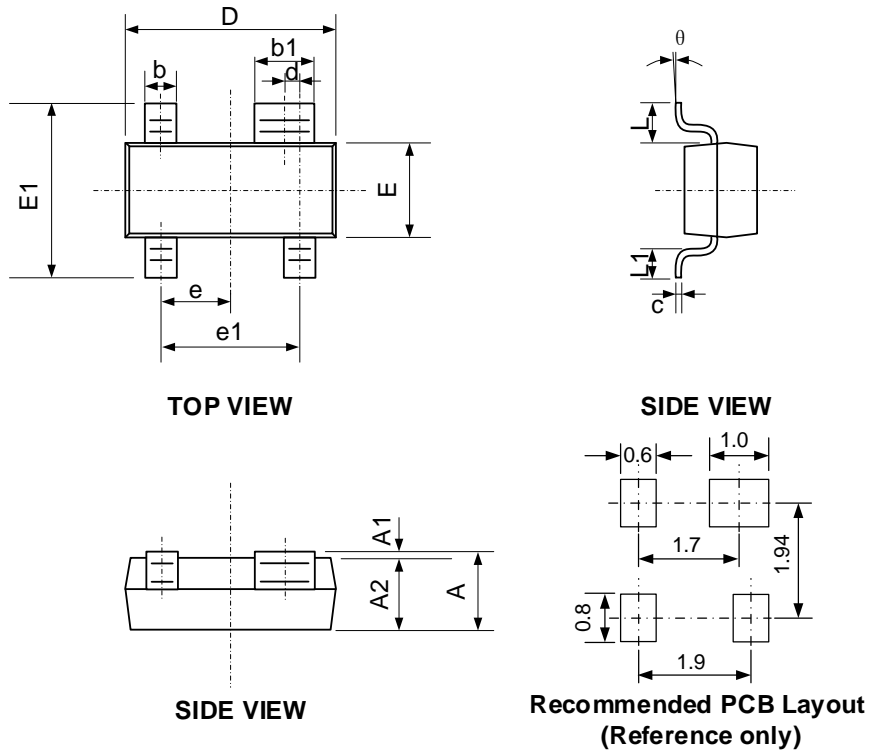
### Universal Serial Bus ESD Protection

Pin2 of SY205229AWC is connected to the D+ of one USB port, and Pin3 is connected to the D- of the same port. To ensure power line protection, connect Pin4 directly to  $V_{BUS}$ .

SY205209ABC is designed to offer ESD protection solutions for various interface applications. By connecting the I/O to the data lines and attaching Pin1 to the ground, any positive transient line-to-ground ESD event can be discharged via the forward steering diode and Zener diode. Additionally, negative line-to-ground transients can be directly discharged to ground through the steering diode. Line-to-line discharges are managed through the Zener diode in combination with two forwarded steering diodes.



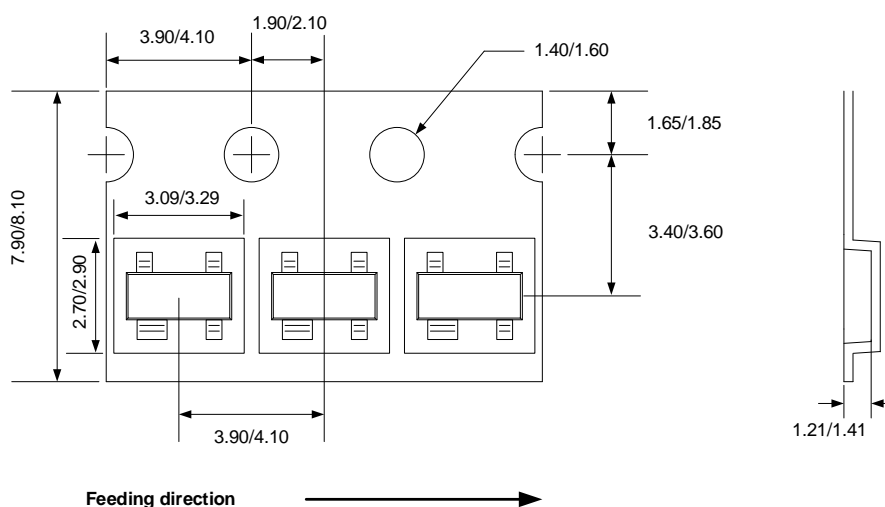
## SOT-143 Package Outline



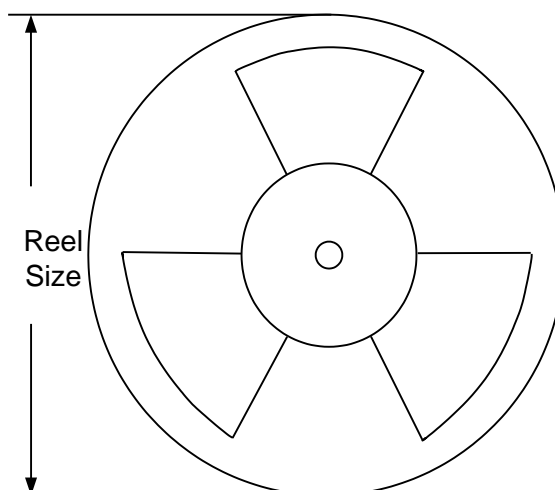
**Note:** All dimensions are in millimeters and exclude mold flash and metal burr.

## Tape and Reel Specification

### SOT-143 Taping Orientation



### Carrier Tape & Reel Specification for Packages



Package Types	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (Inch)	Qty per Reel(pcs)
SOT-143	8	4	7"	3000





**Revision History**

The revision history provided is for informational purpose only and is believed to be accurate, however, not warranted. Please make sure that you have the latest revision.

Revision Number	Revision Date	Description	Pages changed
0.9	08/14/2020	Initial Release	
1.0	08/14/2021	Production Release	



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