

### General Description

SY205214ABC 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 0.6pF, SY205214ABC is designed to protect against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD) ( $\pm 20\text{kV}$  air,  $\pm 20\text{kV}$  contact discharge), IEC 61000-4-5 (surge) (3A, 8/20 $\mu\text{s}$ ).

The combined features of low capacitance, small size, and high ESD robustness make SY205214ABC ideal for high-speed data ports and high-frequency lines (e.g., HDMI and DVI) applications. The low clamping voltage of the SY205214ABC guarantees minimum stress on the protected IC.

Each SY205214ABC device can protect four high-speed data lines. The SY205214ABC is available in a compact SOT23-6 package.

### Features

- Transient protection for High-Speed data lines
  - IEC 61000-4-2 (ESD)  $\pm 20\text{kV}$  (Air)  $\pm 20\text{kV}$  (Contact)
  - IEC 61000-4-5 (Surge) 3A (8/20 $\mu\text{s}$ )
- For operating voltage of 5V and below
- Small package (2.9mm  $\times$  2.8mm  $\times$  1.4mm)
- Protects four data lines
- Low capacitance: 0.6pF typical (I/O-GND)
- Low leakage current: 0.1 $\mu\text{A}$  @  $V_{\text{RWM}}$  (Typical)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for  $\pm 8\text{kV}$  contact discharge.

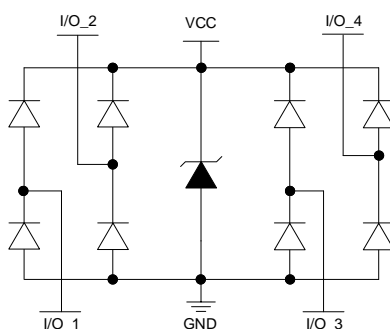
### Applications

- Serial ATA
- PCI Express
- Desktops, Servers, and Notebooks
- MDDI Ports
- USB2.0 Power and Data Line Protection
- Display Ports
- High-Definition Multi-Media Interface (HDMI)
- Digital Visual Interfaces (DVI)

### Mechanical Characteristics

- SOT23-6 package
- Flammability rating: UL 94V-0
- Marking: Part Number, Date
- Packaging: Tape and Reel

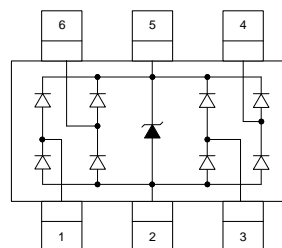
### Circuit Diagram



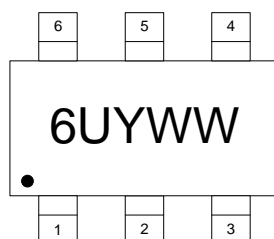
## Ordering Information

Part Number	Package Type	Top Mark
SY205214ABC	SOT23-6 RoHS Compliant and Halogen Free	6UYWW

## Pinout (Top View)



## Marking Codes



**Note 1:** “6U” is device code, fixed.

**Note 2:** “YWW” is date code.

Absolute Maximum Rating				
Parameter	Symbol	Min	Max	Unit
Maximum Peak Pulse Current (8/20μs)	$I_{PP}$		3	A
Maximum Peak Pulse Power (8/20μs)	$P_{PK}$		.36	W
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$V_{ESD}$	-20	20	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 @ $V_{RWM}$	$I_R$	$V_{RWM} = 5\text{V}$ , $T = 25^\circ\text{C}$ Between I/O and GND		0.1	1.0	μA
Reverse Breakdown Voltage @ $I_T$	$V_{BR}$	$I_T = 1\text{mA}$ Between I/O and GND	6.0	8.0	10.0	V
Clamping Voltage @ $I_{PP}$	$V_C(1)$	$I_{PP} = 3\text{A}$ , $t_p = 8/20\mu\text{s}$ Between I/O and GND		10	12	V
Clamping Voltage @ $I_{PP}$	$V_C(1)$	$I_{PP} = 16\text{A}$ , $t_p = 10/100\text{ns}$ Between I/O and GND		10.5	12.5	V
Dynamic Resistance	$R_{DYN}(1) (2)$	$t_p = 10/100\text{ns}$ Between I/O and GND		0.2		Ω
Parasitic Capacitance	$C_{ESD}(1)$	$V_R = 0\text{V}$ , $f = 1\text{MHz}$ Between I/O and GND		0.6	0.8	pF
Parasitic Capacitance	$C_{ESD}(1)$	$V_R = 0\text{V}$ , $f = 1\text{MHz}$ Between I/O and I/O		0.25	0.4	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  $I_{PP}=16\text{A}$ ,  $t_p = 10/100\text{ns}$ .

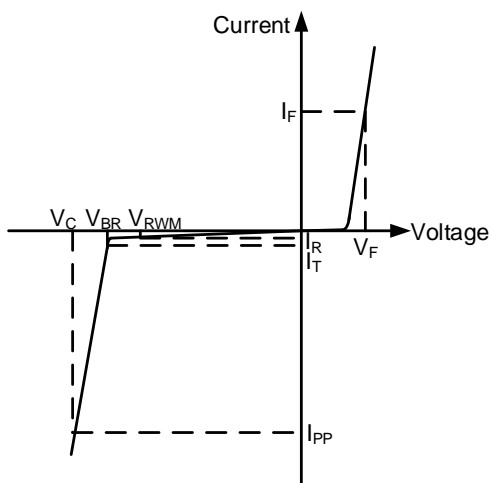
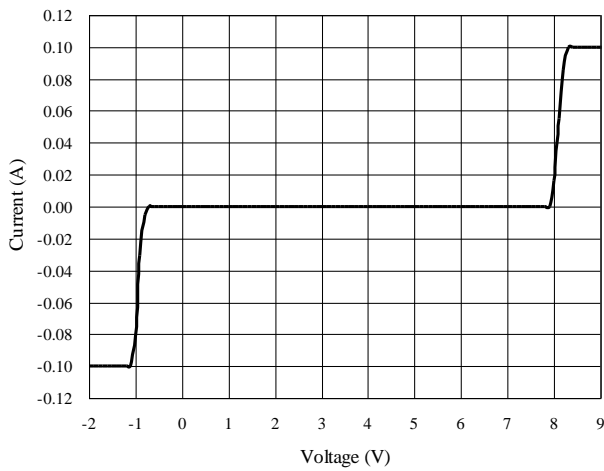


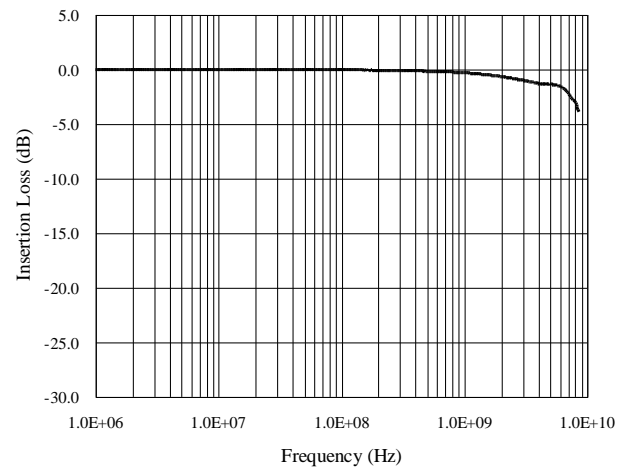
Figure 1. Uni-directional TVS

## Typical Characteristics

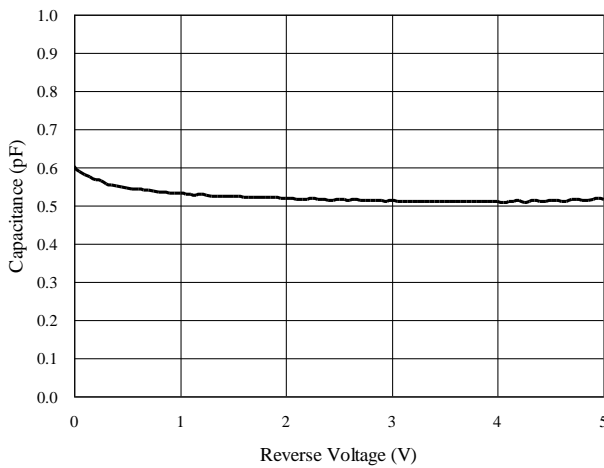
### Voltage Sweeping of I/O to GND



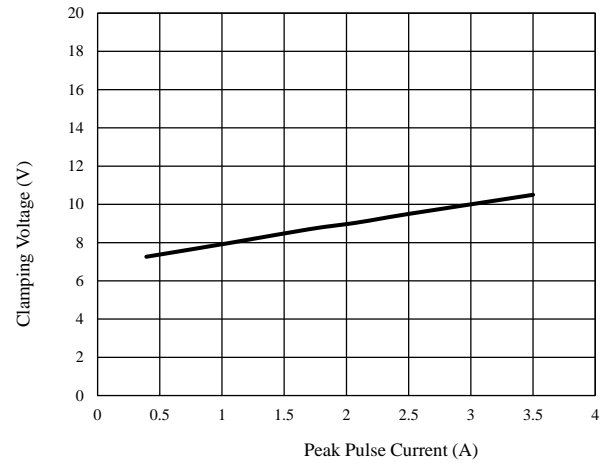
### Insertion Loss S21 of I/O to GND



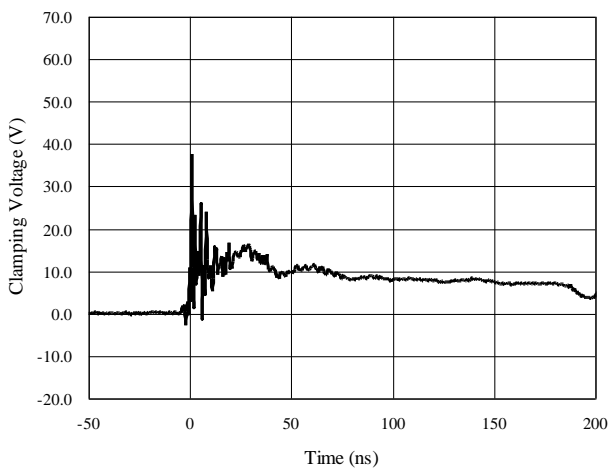
### Capacitance vs. Voltage of I/O to GND (f = 1MHz)



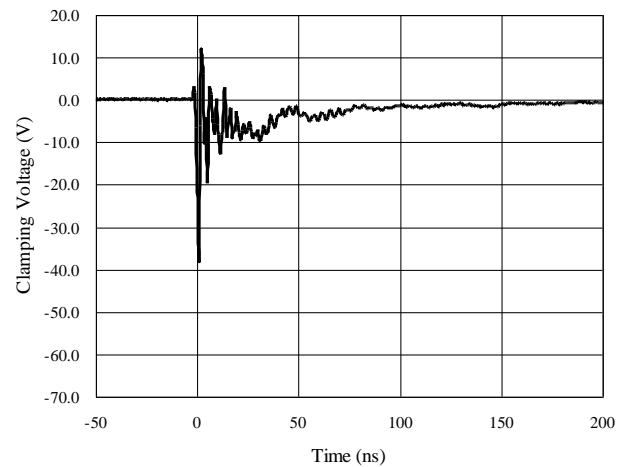
### Clamping Voltage vs. Peak Pulse Current (8/20μs)



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



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

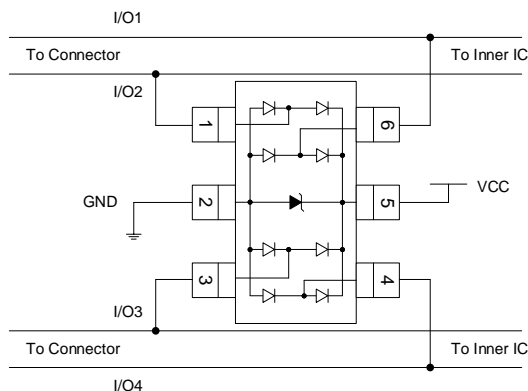


## Application Information

### Pin Connections

SY205214ABC is designed to provide ESD protection for four data lines simultaneously. The pin connections are shown in Figure 2.

The four parallel data lines can be connected from the protected IC to the I/O port connector and directly to the four SY205214ABC I/O pins. Pin2 of SY205214ABC 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.

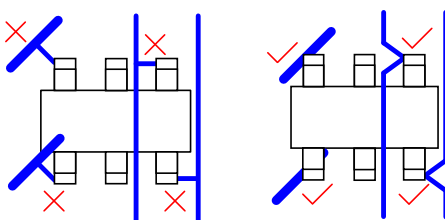


**Figure 1. SY205214ABC Pin Connections in PCB**

### PCB Layout Guidelines

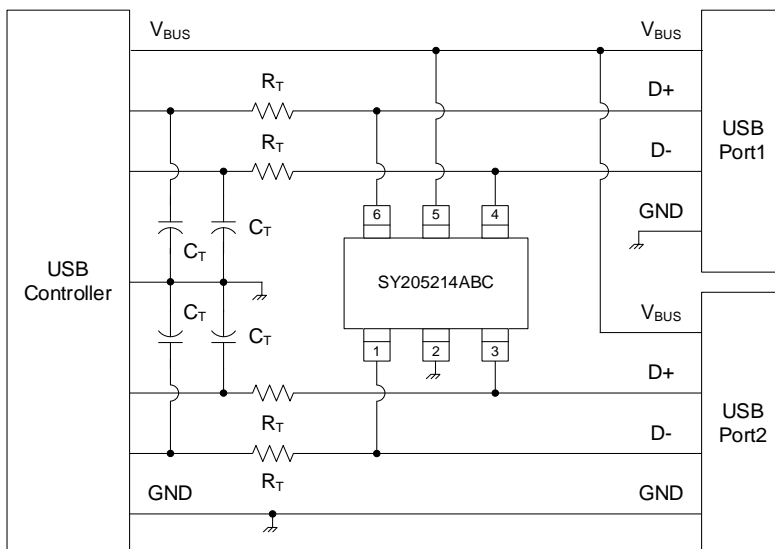
For optimum ESD protection and circuit performance, the following PCB layout guidelines are recommended:

- Place SY205214ABC as close to the connector port as possible.
- The distance between the SY205214ABC ground pin and the GND reference path should be as short as possible.
- Use a large via to connect the SY205214ABC VCC and GND pins to the PCB VCC and GND.
- Avoid running critical signals near board edges.

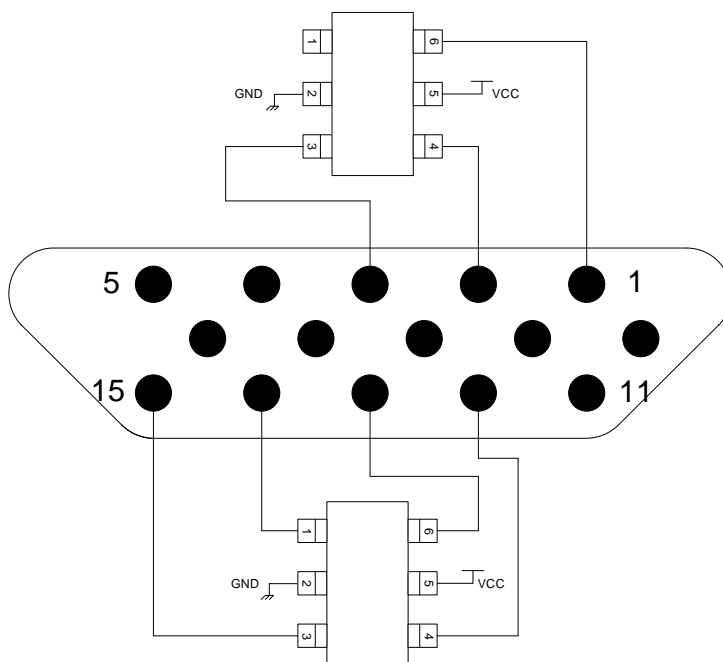


**Figure 3. SY205214ABC Layout Guideline**

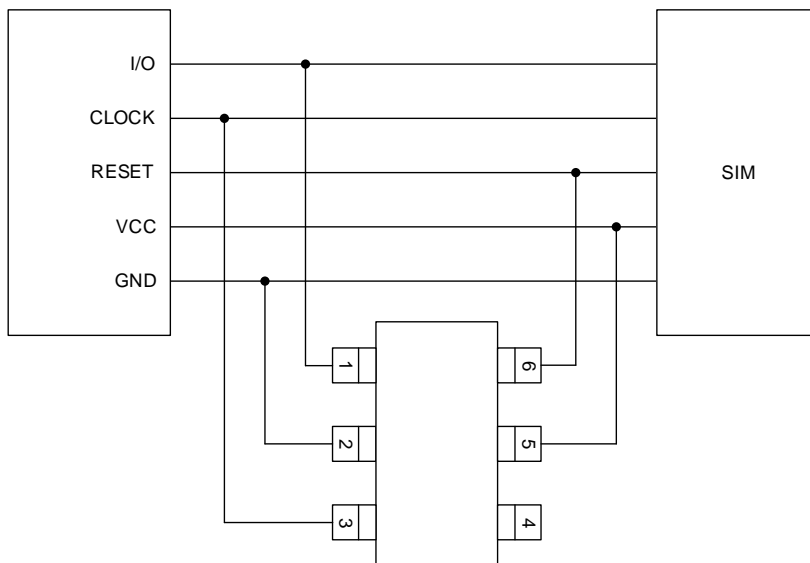
## Universal Serial Bus ESD Protection



## Application Information

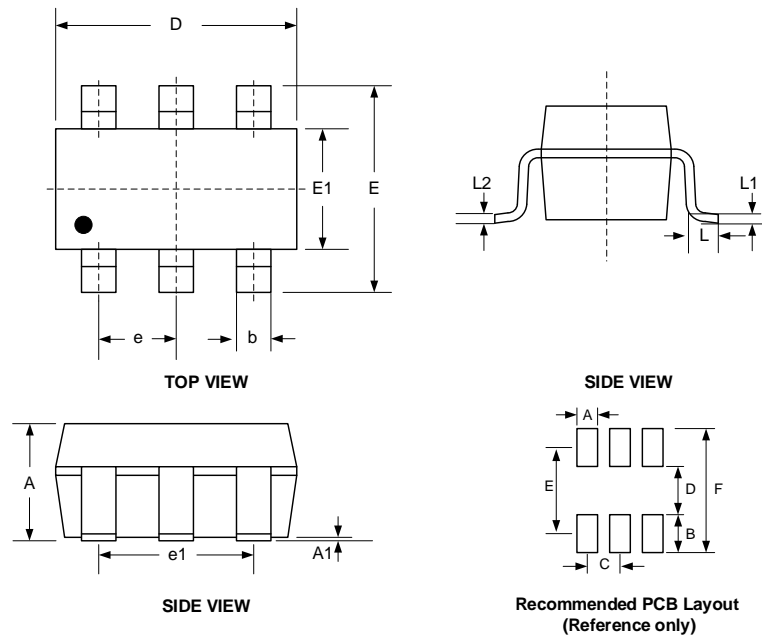


Layout Top View for Video (VGA) Interface with SY205214ABC



**Layout Top View for SIM Port with SY205214ABC**

## SOT23-6 Package Outline



### Package Dimensions

Symbol	Dimensions In Millimeters	
	Minimum	Maximum
A	1.00	1.30
A1	0.01	0.10
D	2.80	3.10
E	2.70	3.00
E1	1.50	1.70
b	0.30	0.50
e	0.95 TYP	
e1	1.90 TYP	
L	0.30	0.60
L1	0.25 TYP	
L2	0.10	0.15

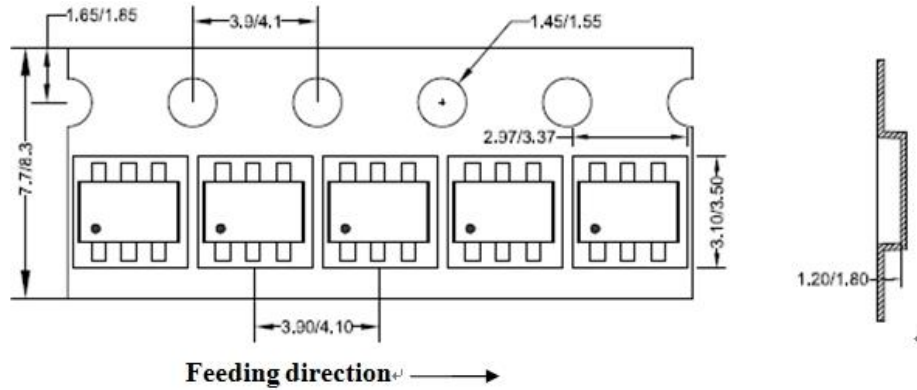
Symbol	Dimensions	
	Millimete	Inches
A	0.60	0.024
B	1.10	0.043
C	0.95	0.037
D	1.40	0.055
E	2.50	0.098

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

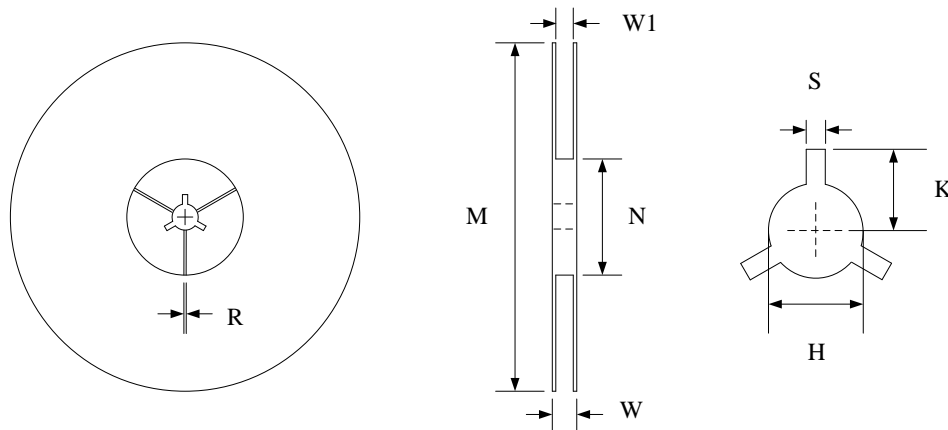


## Tape and Reel Specification

### SOT23-6 Taping Orientation



### Carrier Tape & Reel Specification for Packages



Symbol	Reel Size	M	N	W	W1	H	S	K	R
Dimensions (mm)	Φ178	178.0±1.0	60.0±1.0	11.5±0.5	9.0±0.5	13.0±0.5	2.0±0.1	11.0±0.2	1.0±0.05

Package Types	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (Inch)	Qty per Reel (pcs)
SOT23-6	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	10/14/2016	Initial Release	
1.0	10/14/2017	Production Release	



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